VOL. 67. PART 4 OCTOBER, 1948

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DEPARTMENT OF AGRICULTURE

QUEENSLAND AGRICULTURAL JOURNAL

At the Farm Square Trough, State Agricultural College.

LEADING FEATURES

"Hormone" Weedkillers.

Tomato Variety Investigations.

The Light Brown Apple Moth.

Big Bud in Tomatoes.

The Tail Strip Operation.

Brucellosis in Cattle.

Fruit-spotting Bug, a Pest of the Queensland Nut.

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Volume 67 Part 4

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
C. W. WINDERS, B.Sc.Agr.

OCTOBER, 1948

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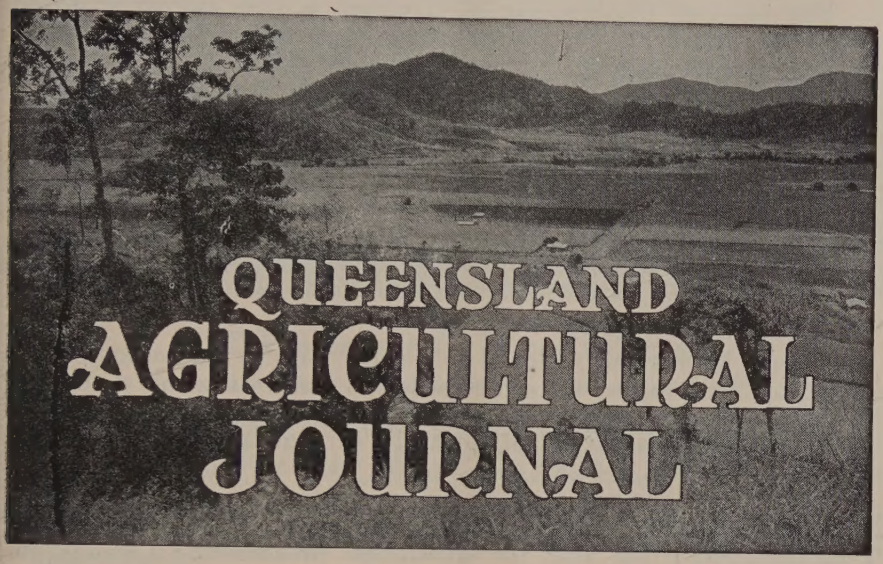


QUEENSLAND AGRICULTURAL JOURNAL

Volume 67 1 OCTOBER, 1948 Part 4

Event and Comment.

Livestock Breeding.

NOTED American animal breeder, Professor Jay L. Lush, of Iowa State College, was warmly welcomed by scientific workers and practising livestock breeders when he visited Queensland in September. He came with a solid reputation as a geneticist and breeder and had some stimulating things to say to local stockraisers.

In a broadcast talk in the A.B.C. Country Hour session, Professor Lush outlined recent advances in genetics which the scientific worker is using as his tools in the improvement of livestock.

One of these advances is a better understanding of the "mathematics of inheritance." While the individual offspring gets half of its character-determining factors from each parent, the halves which it gets are only sample halves and within a group of offspring there may be wide variations. A knowledge of how these variations are brought about enables the breeder to sort out significant from insignificant facts and permits him to ignore with confidence occasional happenings that deviate far from the average. Progeny testing is now receiving increased attention from animal breeders following the elucidation of the sampling nature of inheritance.

The testing of a particular individual has in the past been based largely on that individual's performance. Plant breeders have for a long while been using the "sib" test—that is, the "sister-brother" test—for assessing the value of bred material. This test, as its name implies, consists in the evaluation of an individual's brothers and sisters as well as the individual itself. Obviously, the value of sib-testing is strictly limited in the case of the less prolific lines of livestock, but the test is now being applied in poultry and pig improvement.

The basis of line-breeding of livestock is now becoming better understood, and as the factors governing it are sorted out the method can be organised to yield the best possible results.

Professor Lush gave some interesting information regarding progress being made in the use of hybrid vigor in livestock breeding, and indicated that it is now being commercialised in the the same way as hybrid maize. The procedure is to develop inbred lines, test these lines and their crosses, select the best of the crosses, and finally multiply the chosen crosses for commercial distribution. In the case of chickens, which lend themselves more than any other type of domestic animal to improvement by hybridisation, several years are required to build up to the stage of commercial production.

Though he was able to spend only a few days in Queensland, Professor Lush managed to visit a few cattle and sheep studs and to discuss breeding plans with representatives of Government Departments and breed societies. His survey of Australia's requirements in technical services in livestock genetics and breeding should yield useful results.

Radio Listening Groups.

THROUGHOUT the year the Australian Broadcasting Commission runs a series of broadcasts for discussion by listening groups, which can take the form of members of a family, a group of friends or a club. The object of these programmes is to develop an informed public opinion on important questions of the day by discussion of broadcasts and supplementary material by members of the listening groups.

The A.B.C. provides listening groups with scripts of the broadcasts, questions for discussion, and supplementary literature. It invites groups to send in reports of their discussions together with questions. The reports are referred to an authority on the subject concerned and replies to questions are furnished. At the conclusion of each series, a bulletin of the more significant issues and queries raised by groups is mailed to all registered groups.

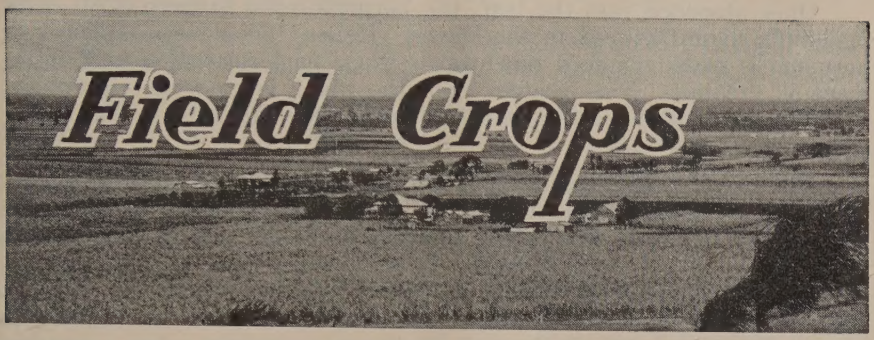
A series on "Heredity and Man," incorporating a broadcast on "The Application of Genetics to Domestic Animals," commences on 20th December. Subsequent series include "All Work and No Play? . . . .," "Fuel," and "What's Your Solution to the Growing Social Conflict?"

Readers interested in forming a listening group should write to The Organiser of Listening Groups, G.P.O. Box 487, Sydney.

Improvement of Citrus Trees.

UNDER its Citrus Budwood Scheme, the Department supervises the collection and distribution of all budwood of the major citrus varieties which have been classified as "A" grade varieties. The buds are taken, in the main by Departmental officers, from trees which are known to be true to type, free from disease and of good cropping capacity. Since its inception in 1934 the scheme has stimulated a steady improvement in the quality of the State's citrus plantings.

During the recent spring budding period, over 100,000 buds were collected and distributed to nurserymen. This is a record for a single season and is an indication of the keen demand for young citrus trees of good quality.



"Hormone" Weedkillers.

C. W. WINDERS, Officer in Charge, Information Services.*

ONE of the most promising of the modern developments in weed control is the use of what are known as growth-regulating substances, or hormones. These substances occur naturally in plants, where they serve to regulate certain of the plant's activities, just as secretions from the thyroid and other glands regulate certain functions of the animal body.

Effects on Plants.

When applied in more than minute amounts, hormones upset the normal rhythm of plant growth and development, causing effects ranging from slight distortion of leaves to death of the entire plant. The effect on a particular species varies with growing conditions and stage of growth, and possibly other factors are of importance also. Therefore, the results observed after spraying certain weeds with hormone weedkillers can be very variable and it may be a considerable time before the best conditions for killing such weeds have been determined.

An important point to bear in mind is that, once beyond the early seedling stage, grasses and cereals are seldom more than slightly damaged by hormone weedkillers. Hence, the hormones are useless against grown plants of Johnson grass, crowsfoot, summer grass, paspalum, couch grass and the like, though injury may be caused to flat-leaved grasses, such as broad-leaved carpet grass, under turf conditions.

The fact that members of the grass family possess a high degree of tolerance towards hormone weedkillers enables such weedkillers to be used in pastures, lawns, cereal crops, and sugar-cane for the control of susceptible broad-leaved weeds.

Method of Action.

In the case of susceptible annual weeds sprayed when young, a thorough application will upset the functioning of the leaves and cause death fairly rapidly. Older plants, which have had a chance to put away reserve foodstuffs in their lower stems and roots, must absorb the weedkiller and carry it down to the roots before a kill can be assured.

Absorption takes place largely through the surface of the leaf. It is, therefore, desirable to use sufficient of the spray solution to thoroughly wet the leaf surface, at least the top surface, and for waxy leaves the spray should carry a spreader and sticker. Most of the hormone weedkillers on the market have such an agent already mixed with them.

* Formerly Agrostologist, Division of Plant Industry.

Once absorbed into the leaf, the hormone travels downwards with foodstuffs manufactured in the leaves. Hence, the greatest amount of hormone is usually moved downwards when food formation and movement is greatest. This occurs when the plant is growing vigorously, usually well before seeding, and, for our major weeds, in warm sunny weather.

The leaves and stems must be allowed to remain on sprayed plants to ensure movement of the hormone to the basal portions. Do not brush or mow for at least a week after spraying and even then do not remove the plant too close to the ground. In some cases there is an immediate severe or even complete falling of leaves following spraying. This is an unfortunate occurrence, for it means that the plant is unlikely to absorb sufficient hormone through its stems to produce a kill. Another spraying when the plant recovers is required.

Many woody plants have a high proportion of leaves that do not function vigorously in food manufacture. For best results against such plants it is desirable to stimulate the production of young, active leaves by such means as brushing and burning. The regrowth is then sprayed when growing actively, the hormone thus being taken into the leaves and freely moved to the food storage organs. This applies to shrubby weeds such as groundsel bush and lantana.

Types of Hormone Weedkillers.

There is a variety of types of hormone weedkiller, most being prepared from phenoxyacetic acids. The brands on the market in Queensland, and the form in which they are made, are as follows. The content of active constituent is given as pounds or percentage of 2,4-D :—

Liquids, to be diluted with water.

"Methoxone," containing the equivalent of 1 lb. of 2,4-D in each gallon. (Distributors—A.C.F. and Shirleys Fertilizers Ltd., Little Roma street, Brisbane.)

"Hormex," containing the equivalent of 5 lb. of 2,4-D in each gallon. (Distributors—Wilcox Mofflin Ltd., Barry parade, Brisbane.)

"Weedone," containing the equivalent of nearly 1 lb. of 2,4-D in each gallon. (Distributors—Pope, Mayne and Southerden Pty. Ltd., 300 Adelaide street, Brisbane.)

Powders, to be dissolved in water.

"Vallo 2,4-D," containing 82% 2,4-D—that is, over $\frac{4}{5}$ lb. 2,4-D in 1 lb. of powder. (Distributors—A. Victor Leggo Pty. Ltd., 185 Mary street, Brisbane.)

"Hardy's 2,4-D," containing 77% 2,4-D—that is, just over $\frac{3}{4}$ lb. 2,4-D in 1 lb. of powder. (Distributors—Brett and Company Pty. Ltd., Grey street, South Brisbane, and International Traders, 228 Roma street, Brisbane.)

"2,4-Diweed," containing 70% of 2,4-D—that is, slightly less than $\frac{3}{4}$ lb. of 2,4-D in 1 lb. of powder. (Distributors—H. Blaiklock & Co. Pty. Ltd., 150 Mary street, Brisbane.)

Dust form, mainly for lawns.

"Weedust," containing 1 lb. 2,4-D in 50 lb. of dust. (Distributors—Pope, Mayne and Southerden Pty. Ltd., 300 Adelaide street, Brisbane.)

Prices of hormone weedkillers range from about 18s. per lb. of 2,4-D content upwards. Some are supplied at a concession price by the Department of Public Lands for Noogoora burr destruction only. All of the preparations listed will kill readily susceptible weeds such as Noogoora burr. Those with a spreader incorporated or in an oily form are most effective against waxy-leaved plants.

Quantity Required.

In the list of individual weeds given later, mention is made of concentrations recommended. At this stage it is desirable to make a brief general statement on quantities required. For all practical purposes there is a lower limit and an upper limit to the amount of weedkiller which can be used per acre of weed. Roughly, for an acre of weed which is sufficiently dense to require something like 100 gallons of spray solution, applied by means of a knapsack sprayer, from 1 lb. to 3 lb. of 2,4-D (or its equivalent) is necessary, the lower amount for easily killed weeds such as Noogoora and Bathurst burrs and the higher amount for more resistant species. Approximately one pound of 2,4-D is contained in 1 gallon of "Weedone" or "Methoxone," or in $1\frac{1}{4}$ to $1\frac{1}{3}$ lb. of the powder preparations. One gallon of "Hormex" contains 5 lb. of 2,4-D.

Method of Application.

For farm and station purposes, the hormone weedkillers marketed in Australia are intended for application as sprays. Though equipment recently developed in the United States allows some types to be applied at the rate of 1 gallon of the weedkiller to 2 gallons of water per acre, such low-volume application is not yet practised in Queensland. The knapsack sprayer is commonly used, applying about 100-130 gallons of solution per acre, but the Lands Department has demonstrated that ordinary jetting plants can be employed with economy in the use of spray solution.

Precautions to be Taken.

There is no danger in using the hormone weedkillers on pastures or in other areas to which stock have access, as they are non-poisonous to animals. However, crops other than sugar-cane, cereals and grasses may be seriously damaged and direct application of sprays to such crops should not be made. Further, drifting of the spray on to these crops should be avoided, and spray equipment should be thoroughly cleansed as recommended by the manufacturers of the various preparations before it is used for insecticides or other spray purposes.

Susceptibility of Plants.

The following lists indicate the plants which may be readily killed, those which are killed under some circumstances, and those which are resistant. Some of the botanical names given are not strictly correct, but are those by which the weeds are most commonly known in Queensland.

READILY SUSCEPTIBLE—HIGH PERCENTAGE OF KILL IF SPRAYED UNDER RIGHT CONDITIONS.

Annuals.

	Per acre.
Asthma plant (*Euphorbia pilulifera*)	1 lb.
Bathurst burr (*Xanthium spinosum*)	1 lb.
Bell vine (*Ipomaea plebeia*)	1 lb.
Bluetop or billygoat weed (*Ageratum conyzoides*)	1 lb.
Bullhead or cathead (*Tribulus terrestris*)	1 lb.
Burr trefoil (*Medicago denticulata*)	1 lb.
Chicory (*Cichorium intybus*)	1 lb.
Cobblers' pegs (*Bidens pilosa*)	1 lb.
Dead nettle (*Lamium amplexicaule*)	1 lb.
Devil's claws (*Martynia* spp.)	1 lb.
Fennel (*Foeniculum vulgare*)	1½ lb.
Hexham Scent (*Melilotus parviflora*)	1 lb.
Horehound (*Marrubium vulgare*)	1 lb.
Mallow (*Malva parviflora*)	1½ lb.
Milk thistle (*Sonchus oleraceus*)	1 lb.
Milkweed (*Euphorbia drummondii*)	1 lb.
Mint weed (*Salvia reflexa*)	1 lb.
Noogoora burr (*Xanthium pungens*)	1 lb.
Oriental rocket (*Sisymbrium orientale*)	1 lb.
Pigweed (*Portulaca oleracea*)	1 lb.
Prickly lettuce (*Lactuca scariola*)	1½ lb.
Ragweeds (*Erigeron canadensis* and *E. linifolius*)	1½ lb.
Red caustic creeper (*Euphorbia prostrata*)	1½ lb.
Saffron thistle (*Carthamus lanatus*)	1½ lb.
Shepherd's purse (*Capsella bursa-pastoris*)	1 lb.
Spiny emex or double gee (*Emex australis*)	1½ lb.
Staggerweed (*Stachys arvensis*)	1 lb.
Star burr (*Acanthospermum hispidum*)	1 lb.
Stinking Roger (*Tagetes glandulifera*)	1 lb.
Texas sage (*Salvia coccinea*)	1 lb.
Turnip weed (*Raphanus raphanistrum*)	1 lb.
Wild hop (*Nicandra physaloides*)	1½ lb.
Wild radish (*Rapistrum rugosum*)	1 lb.
Wireweed (*Polygonum aviculare*)	2 lb.
Yellow weed (*Galinsoga parviflora*)	1 lb.

Biennials and Perennials.

Bindweed (*Convolvulus arvensis*)	2 lb.
Bryophyllum (*Bryophyllum calycinum*)	1 lb.
Carrot weed (*Daucus glochidiatus*)	1 lb.
Castor oil plant (*Ricinis communis*)	1 lb.
Common vervain (*Verbena officinalis*)	2 lb.
Devil's apples (*Solanum sodomaeum*)	2 lb.
Dodder (*Cuscuta australis*)	2 lb.
Duckweed (*Lemna oligorrhiza*)	1 lb.
Flannel weed (*Sida cordifolia*)	2 lb.
Flatweed (*Hypochaeris radicata*)	1 lb.
Gomphrena weed or soft khaki weed (*Gomphrena celosioides*)	2 lb.
Groundsel-bush (*Baccharis halimifolia*)	2 lb.
Guava (*Psidium guajava*)	2 lb.
Hemlock (*Conium maculatum*)	1½ lb.
Hoary cress (*Lepidium draba*)	2 lb.
Indian weed (*Siegesbeckia orientalis*)	2 lb.
Inkweed (*Phytolacca octandra*)	2 lb.
Khaki weed (*Alternanthera repens*)	1 lb.
Lantana (*Lantana camara* and *L. sellowana*)	2 lb.
Mexican clover (*Richardsonia scabra*)	1 lb.
Morning glory (*Ipomaea purpurea*)	1 lb.
Mullumbimby couch (*Kyllinga monocephala*)	2 lb.
Needle burr (*Amaranthus spinosus*)	2 lb.
Paterson's curse (*Echium plantagineum*)	1 lb.
Pennyroyal (*Mentha satureoides*)	1 lb.
Pennywort (*Hydrocotyle asiatica* and *H. laxiflora*)	1 lb.
Pepperwort (*Lepidium ruderale*)	1½ lb.

Pink-flowered Chinese burr (*Urena lobata*)	2 lb.
Plantains (*Plantago* spp.)	1 lb.
Poinsettia (*Euphorbia pulcherrima*)	1½ lb.
Purple-top (*Verbena bonariensis*)	2 lb.
Scotch thistle (*Cirsium lanceolatum*)	2 lb.
Star of Bethlehem (*Ipomaea quamoclit*)	1½ lb.
Star thistle (*Centaurea calcitrapa*)	2 lb.
Streaked rattlepod (*Crotalaria striata*)	1½ lb.
Swinecress (*Coronopus didymus*)	1½ lb.
Variegated thistle (*Silybum marianum*)	2 lb.
Wandering Jew (*Commelina cyanea*)	2 lb.
Water hyacinth (*Eichornia crassipes*)	2 lb.
Weir vine (*Ipomaea calobra*)	2 lb.
White clover (*Trifolium repens*)	2 lb.

SOMEWHAT SUSCEPTIBLE, BUT PERCENTAGE KILL VERY VARIABLE.

Black pigweed (*Trianthema portulacastrum*).
Common thorn apple or stramonium (*Datura stramonium*).
Crofton weed or mist flower (*Eupatorium riparium*).
Devil's fig (*Solanum torvum*).
Fat hen (*Chenopodium album*).
Fishweed (*Chenopodium triangulare*).
Green amaranth (*Amarantus viridis*).
Green cestrum (*Cestrum parqui*).
Lilac-flowered oxalis (*Oxalis corymbosa*).
Mexican or prickly poppy (*Argemone mexicana*).
Nut grass (*Cyperus rotundus*).
Redheaded cotton bush (*Asclepias curassavica*).
Sensitive plant (*Mimosa pudica*).
Sida retusa or Paddy's lucerne (*Sida rhombifolia*).
Tick trefoil (*Desmodium triflorum*).
Upright mist flower (*Eupatorium adenophorum*).
Veined vervain (*Verbena venosa*).
Waterpepper (*Polygonum hydropiper*).
Wild tobacco (*Solanum auriculatum*).

RESISTANT, OR PERCENTAGE KILL VERY SMALL.

Bracken fern (*Pteridium aquilinum*).
Cape gooseberry (*Physalis peruviana*).
Fumitory (*Fumaria parviflora*).
Galvanised burr (*Bassia birchii*).
Ground cherries (*Physalis* spp.).
Long-spined thorn apple (*Datura ferox*).
Milky cotton bush (*Asclepias fruticosus*).
Wild verbena (*Heliotropium amplexicaule*).
Yellow oxalis (*Oxalis corniculata*).
All true grasses, such as couch grass, mat grass, Johnson grass, burr grasses, blady grass, sour grass, spear grass, etc.

CROP PLANTS WHICH MAY BE DAMAGED.

Beans.	Carrot.	Stone and pip fruits.
Beetroot.	Lucerne.	
Cabbage.	Flax.	Onion.
Cauliflower.	Cotton.	Pineapple.
Tomatoes.	Tobacco.	Banana.
Radish.	Grapes.	Pumpkin.
Turnip.	Citrus.	

CROP PLANTS RESISTANT TO ORDINARY STRENGTHS.

Wheat, Oats, Barley.	Maize. Sorghum.	Sugar cane. Millets.

Tomato Variety Investigations in the Stanthorpe District.

A. A. ROSS, Horticulturist, Horticulture Branch.

(*Continued from page* 142, *September*, 1948.)

Group 2.

Varieties included in this group may produce quite satisfactory yields of good quality fruit if growing conditions meet their requirements, but in general they are not as reliable as those in Group 1. Brief mention of their most outstanding characteristics will be sufficient to indicate their suitability or otherwise for any particular set of conditions.

Bounty.

A first-early variety which matures its fruit in a comparatively short period. It has a dwarfed, compact, determinate bush which is somewhat unthrifty and requires the best of soil and weather conditions to produce a reasonable yield. The fruit is of excellent quality, has a good appearance, and carries well. It is rather susceptible to leaf diseases, having freely contracted target spot and bacterial spot in trials while other varieties have remained comparatively free. It is, however, resistant to sunscald despite the open habit of the bush. On account of its dwarf habit it could be planted as close as 3 ft. by 4 ft., which would have an appreciable effect on the yield per acre.

Break o' Day.

An early variety with a fairly extended cropping period. Selected strains do well as an early crop if weather conditions are suitable, but droughty conditions produce severe radial and circular cracking. The open habit of the vine induces a considerable amount of sunscald, which is accentuated by the fact that in this district the crop is wholly summer grown.

Essary.

A mid-season variety with a vine of spreading habit and rather sparse foliage. In local trials, early pickings were light but later pickings were very satisfactory. Fruit is of good quality, being deep globe shaped, smooth, and firm. The strains tested were somewhat variable but should improve with further selection. Indications are that it is resistant to Septoria leaf spot and tolerant to Fusarium wilt.

Garden State.

A mid-season variety with a large, vigorous vine. The fruit is large and firm but has a large corky ring at the stem attachment and is slightly angular in shape. The yield is good and the fruit carries particularly well. With further selection to improve its shape it will possibly develop into a valuable variety.

Marglobe.

A mid-season to late variety which produces excellent yields of good quality fruit when conditions are favourable, but when hot, dry weather prevails it cracks badly, particularly radially, at the stem end. Its carrying capacity is not equal to that of the Group 1 varieties.

Marhio.

Two strains are commonly grown in this district—the pink and the red. The pink is the original selection from Marglobe. Both produce fruit of excellent quality and size, and their cropping capacities are reasonably good. Like the parent variety, Marglobe, they are subject to cracking under adverse conditions, and their yields are not of the same order as Group 1 varieties, setting being rather poor in cool weather. The pink strain is at a disadvantage from the market point of view.

Marvana.

This variety failed to produce reasonable yields in most trials and, in addition, the fruit is slightly ribbed and flat in shape. Given good growing conditions average crops can be expected, but general planting with this variety cannot be recommended.

Matchless.

A variety producing fruit of good size and shape, but they are soft and of poor carrying capacity. The yield is fairly good but it can only be considered a second-rate variety.

Norton.

A late-maturing variety selected because of its resistance to Fusarium wilt. Fruit are of good size and appearance but are too soft to carry well. Under hard growing conditions it becomes subject to blossom-end rot and catface. Yield is only fair and this can only be considered a second-rate variety.

Pearson.

A mid-season variety with a determinate habit. Fruit are of good quality, being large, smooth, and globe-shaped, but they tend to be somewhat soft. Under favourable conditions yields are very satisfactory, but under dry conditions the size of the fruit becomes very much reduced and a large proportion of the crop is too small to be marketed. Large fruit have the defect of having a heavy white fibrous core.

Penn Heart.

A first-early variety which has a dwarfed bush and crops very heavily. Fruit is of good quality but has the failing of being flat in shape, which interferes with mechanical grading and makes packing slightly more difficult. For growers who do not employ mechanical graders this variety should be very profitable as it can be planted as close as 3 ft. by 4 ft. and under such conditions will produce a large number of cases per acre. It is susceptible to wilt and produces some "catface" but is resistant to sunscald.

Penn State.

A dwarfed second-early variety somewhat similar to Penn Heart but flatter and slightly ribbed. Circular cracking is common. It does not yield as well as Penn Heart and cannot be recommended in preference to it.

Pritchard.

Very similar to Pearson, having a compact determinate bush, but the quality of fruit is not so good. It shares the failing that under dry conditions the size of fruit is so reduced as to render a large proportion of it unsaleable.

Riverside.

A variety with a large, dense bush which carries large, globe-shaped fruit. The majority of fruit is of marketable size and it yields reasonably well under good conditions, though it is somewhat inferior to Group 1 varieties in this respect. It has been specially developed for its resistance to Verticillium wilt.

Rutvel.

A selection from the progeny of a cross made in Queensland in 1939 between Rutgers and Marvel in the course of a breeding programme designed to develop varieties resistant to Fusarium wilt. It is a second-early variety with a fairly well extended cropping period. The vine is non-determinate, open, sprawling, and of medium size. The fruit is of uniform, desirable size and typically globe-shaped. It is firm, has a good appearance, and carries well and therefore meets market requirements very satisfactorily. Rutvel is, however, less successful under adverse conditions than the varieties included in Group 1. The recommended planting distance is 6 ft. by 6 ft.

Stone.

As one of the parents of Globe, this variety is an ancestor of many of the present day types and produces reasonably good yields of quite attractive, large fruit. The fruit are, however, rather thin-skinned and the walls are thin, which impairs its carrying capacity. Thus, for Stanthorpe conditions, it cannot be recommended.

Group 3.

Varieties included in this group are much inferior to those of Group 1 in regard to both cropping capacity and quality of fruit. They

may, however, be useful for certain purposes and, therefore, cannot be condemned outright. The following notes will indicate their behaviour under Stanthorpe conditions:—

Coventry.—A poor cropper of small fruit with a tendency to crack badly.

Denisonia (Bowen Buckeye Globe).—A very late-maturing variety, success of which depends to a large extent on the weather. The size and the quality of the fruit are good, though sometimes it becomes rather puffy. Its cropping capacity is much less than that of Group 1 varieties.

Firesteel.—A variety producing good quality fruit of desirable size and shape, but the vine is not particularly vigorous and the incidence of spotted wilt has been high in all trial plots.

Indiana Baltimore.—A small-fruited, light-yielding variety which suffered severely under droughty conditions in all trials.

Marvelosa.—A pink-fruited variety which yielded lightly and showed little promise. Size and shape of fruit are satisfactory, but it is inclined to be puffy.

Nystate.—A variety which suffered severely from drought, producing small fruit and light yields. Under better conditions the fruit becomes larger in size but is soft and liable to break down in transit.

Orange Prolific.—A late-maturing, corrugated Chinese variety, which showed little promise. The shape is not as poor as many of the Chinese varieties but its yielding capacity is not sufficiently good to make it worthwhile.

Red Cloud.—Resembling Sioux in outward appearance, the variety produces very firm fruit of excellent size and shape. However, cropping capacity is much inferior to that of Sioux.

Group 4.

Members of this group have performed consistently badly in all trials under Stanthorpe conditions. Each possesses at least one defect which renders it unsuitable for commercial purposes in this district.

Bonny Best.—A poor yielder of soft fruit, particularly susceptible to blossom-end rot and Fusarium wilt.

Burbank.—A flat, ribbed fruit subject to blossom-end rot and catface.

Early Wonder.—A selection of Earliana displaying most of the disadvantages of this variety. It yields poorly and produces badly shaped fruit susceptible to catface and cracking.

Guernsey Beauty.—One of the cluster varieties whose fruit, though slightly larger than average for this type, is still too small to be considered a valuable market variety.

H.E.S. 927.—An unthrifty variety giving a poor yield of small fruit.

Morse's Improved.—Another unthrifty variety giving a light yield of small fruit.

Pan America.—Exhibiting a very high resistance to Fusarium wilt, this variety offers possibilities as a parent for breeding purposes. As a variety, in itself, it produces fruit of quite good quality and size but the yield is disappointingly low.

Potentate.—One of the better cluster varieties which, though producing fruit too small for market under Stanthorpe conditions, would perform well in home gardens.

Recruit.—One of the cluster varieties with no particular attributes.

Rouge de Marmande.—A Chinese variety with very good cropping capacity, but the shape of the fruit is very irregular and the variety is very susceptible to blossom-end rot.

Sensation.—A late-maturing cluster variety with no special characters to commend it.

Stambovoi Alpatev.—A dwarf type introduced from Central Europe, not at all suited to Stanthorpe requirements.

Stemless Penn Orange.—A relatively shy-bearing variety producing very firm, deep-globe shaped, and slightly grooved fruit of an orange colour. This colour would have an adverse effect on their market value.

Stemless Penn Red.—A fairly small, compact bush with fruit of good size, globe-shaped, firm, smooth, and ripening to a bright red colour. The upper hands do not bear well and as a whole the yield is light.

Tatinter.—A dwarf variety with somewhat crinkled and slightly flat fruit. Fruit are of medium size and it has a moderate cropping capacity. It is not suitable for commercial production for the fresh fruit market under Stanthorpe conditions but would possibly be a satisfactory variety for the home garden.

Tatura Dwarf Globe.—A dwarf variety whose fruit are mainly too small for market requirements. It has thin walls and a tender skin and, therefore, does not carry well. Its yield is reasonably good and it would provide a worthwhile home garden variety.

Wanneroo Late.—Producing a moderate yield of medium to small-sized, smooth and flat-globe shaped fruit, this variety showed no outstanding qualities.

Wasatch Beauty.—Showing poor resistance to drought conditions and producing a light yield of small fruit, this variety appeared to have little to commend it for local conditions.

Washington State.—A forcing variety bred for glasshouse culture, and, therefore, suited mostly for staking. Under Stanthorpe conditions fruit were small and the crop light.

SUMMARY.

The Stanthorpe district is one of the State's most important tomato producing areas, particularly since crops are harvested there during the summer and autumn months. It is necessary to select a variety

adapted to local requirements in order to produce maximum yields in this district. Plants must be grown on the ground, and varieties resistant to sunburn and the common leaf diseases are to be preferred.

The market demands a smooth, round fruit of 2¾-in. to 3-in. diameter with good carrying capacity.

Cluster type varieties usually produce an abundance of fruit which is too small for market requirements, while Chinese or Flat Corrugated varieties are unacceptable on account of their irregular shape. Large, smooth, round varieties constitute the only type which meets the whole set of local conditions.

Fusarium wilt is not a troublesome disease in this district and varieties resistant to the disease are not essential at present.

The four varieties included in Group 1.—Sioux (early), Grosse Lisse (mid-season), and Rutgers and Valiant (late)—are high yielding, excellent quality tomatoes. They are specially adapted to Stanthorpe conditions as they crop heavily and consistently and meet market requirements very satisfactorily.

Certain other varieties produce reasonably good crops when seasonal conditions are favourable but may fail under hard conditions.

Plate 61.

ON PARADE AT THE ROYAL SHOW.

PLANT PROTECTION

Fruit-spotting Bug as a Pest of the Macadamia or Queensland Nut.

A. R. BRIMBLECOMBE, Entomologist, Science Branch.

THE Macadamia nut* is a highly nutritious food and is one of the richest oil-bearing nuts known. Its cultivation as a commercial crop is extending in Queensland, where quality nuts are assured of a ready market. Continuity of yield, however, largely depends on the control of several insect pests, such as the Macadamia flower caterpillar† and the Macadamia nut grub.‡ Attention is now drawn to an additional insect pest, a fruit-spotting bug,§ which has extended its activities from other fruit crops to the Macadamia nut, causing serious premature nutfall and nut malformation.

Host Plants and Distribution.

The fruit-spotting bug was first recorded from bananas in the central coastal fruit areas, where it causes a serious fruit spotting. Later it was recognized as a pest of papaws, causing fruit-spotting as well as severe stunting and crinkling of the young growth. Other cultivated and introduced plants on which the bug is known to feed are cassava, citrus, mango, pineapple, cotton, custard apple, granadilla, passion fruit, white passion flower, corky passion flower, beans of various kinds, Palay rubber vine, frangipanni, and Noogoora burr. The native host plants include white cedar, rough leaf fig, orange boxwood, *Pisonia brunoniana*, *Peltophorum ferrugineum*, and *Guoia semiglauca*.

Originally the fruit-spotting bug was an inhabitant of the rain-forest. Its early records were from bananas and later papaws grown in rain-forest areas, but it has since spread widely into other agricultural districts. It is now distributed throughout the eastern coastal fruit belt, though in the past it has been most troublesome in the northern and central districts.

Life History.

The fruit-spotting bug during its life passes through seven stages, namely the egg, five nymphal stages and the adult. The egg is oval in shape, about one-fifteenth of an inch in length, and pale green in colour with a slight opalescence. From it hatches the pear-shaped first stage nymph which is greenish in colour with two prominent dark spots on the

* *Macadamia ternifolia* and its varieties.
† *Homoeosoma vagella* Zell.
‡ *Arotrophora ombrodelta* Lower.
§ *Amolypelta lutescens* Dist.

abdomen. The second, third (Plate 62) and fourth stage nymphs are also pear-shaped, each a little larger than the preceding stage. Each is mostly greenish-orange in colour, again with the two prominent dark spots on the abdomen. The flattened second-last joint of the long black antennae is also a prominent feature. The fifth stage nymph is elongate-oval and more comparable to the adult than to the earlier nymphal stages. Its colour is pale green and it also possesses the characteristic features of the earlier stages. Slight swellings representing the wing-buds are at first noticeable on the third stage nymph and become more conspicuous on the fourth and fifth stages. Change from one stage to another takes place by moulting, when the skin splits along a noticeably clear line down the centre of the back. When the fifth stage nymph moults it produces the mature winged adult bug (Plate 63), which is of slender build, about half an inch in length and usually pale green in colour.

Plate 62.

FRUIT-SPOTTING BUG.—Third stage nymph x 6¼.

[*Drawings by William Manley.*

Plate 63.

FRUIT-SPOTTING BUG.—Adult x 3.

During the summer the egg hatches in six or seven days. The first stage nymph completes its growth in three or four days, the second stage in four to six days, the third in six or seven days, the fourth and fifth each in five to seven days. The period required for complete development from laying of eggs to emergence of adults varies mostly from 34 to 38 days. During the summer months adults have lived for periods ranging up to 54 days, while over the winter months they may live for more than 150 days. One female over the summer period laid as many as 163 eggs.

Breeding work has indicated that in south-eastern Queensland the bug may pass through three generations each year—a spring, a summer and an autumn generation. The adults of the autumn generation live through the winter and commence egg-laying in the spring.

Habits.

Eggs of the spring generation are probably laid on the young foliage and those of the summer generation on the young nuts. Those of the autumn generation are probably laid on the nuts and perhaps also on the foliage. The eggs are placed singly on the host plant and only a few are laid by the one female each day.

Plate 64.
Prematurely Fallen Nuts under a Bug-infested Tree.

The nymphs have comparatively long legs, especially in the earlier stages, when they stand erect with the thorax and head angled upwards. The first two stages are always alert and active and can detect moving objects some distance away. When approached, they quickly move to secluded positions and if on the nuts they move within the shelter of the nut clusters. The later nymphal stages are not so active but readily move to sheltered places when they are disturbed. Early in the morning all stages, especially the adults, are somewhat sluggish. Later in the day the adults are always alert. They hide in the nut clusters or quickly make short flights to other parts of the tree, later returning to the nuts.

The fruit-spotting bug feeds by sucking. The rostrum or beak is normally held under the body but is held upright on the surface of the nut when the insect is about to feed. When the stylets or sucking tubes which are enclosed in the rostrum are inserted into the plant the rostrum is again flexed under the body. On small nuts the stylets are inserted for only part of their length but on larger nuts they penetrate to their full length and thus feeding takes place on the nut kernel.

Nature and Effect of the Damage.

An outstanding feature of fruit-spotting bug attacks on Macadamia nut trees is that comparatively few insects per tree can cause an enormous amount of damage. Both adults and the immature stages may feed on young shoots and on the nuts.

Injured shoots show severe wilting. Sucking insects normally do not cause wilting unless they are present in large numbers on the plant. The fact that one fruit-spotting bug per shoot can cause collapse of the shoots indicates that feeding must be accompanied by the injection of a toxin into the plant tissue. Although shoots are killed in this way, the health of the tree is not affected.

The occurrence of the bugs on the nut clusters has far greater economic consequences. Only a small number of bugs per tree can cause almost complete loss of the crop. Usually the first indication of bug activity is a heavy premature nutfall (Plate 64), a feature similar to that caused by a related species of bug on coconuts in the Solomon Islands. Young nuts up to the size of a marble readily fall when pierced. Older nuts may have to be pierced more than once before they fall, while others though pierced several times may remain on the tree. The older the nut the less likely it is to fall. No external sign of damage is shown on the husk and the excessive nutfall might easily be attributed by mistake to weather or some other cause.

When sectioned, freshly fallen young nuts, up to the size of a marble, show no sign of injury on or in the husk. On the outer side of the shell there is a watery-white spot from which a brown hair-line leads through the soft white tissue to a pale brown area on the inside of the shell. The kernel, instead of being firm in texture and milk white in appearance, becomes jellied and resembles stiff boiled starch. Often when nuts fall while the shell is still soft and white, the tissue surrounding the puncture collapses in an irregular area sometimes up to half an inch across (Plate 65, bottom row). It then shrinks until of only paper thickness and sometimes splits. The kernel also jellies and finally shrivels to a small, shapeless, dry brown structure (Plate 66, top row). A little extra tissue may develop on the inner side of the husk, filling the depression in the shell. In still older nuts, in which the shell is beginning to harden and turn brown, only small depressions develop on the outer and inner surfaces of the shell (Plate 65, middle row), or there may be only a pin point mark on the outer surface (Plate 65, top row), and only part of the kernel may become shrivelled (Plate 66, middle row). Others again show no sign of injury on the shell, though the kernel may be completely or partially affected—at any rate unsuitable for commercial purposes (Plate 66, two nuts in bottom row). Secondary rots or mould development in the shrunken kernels is unusual, and before the fruit-spotting bug was known to attack the nuts the injury was diagnosed as internal collapse due to some unknown cause.

The premature nutfall, the collapse of the shell tissue and the atrophy of the kernel with only a minimum of puncturing clearly indicate that feeding of the bugs is accompanied by the injection of a toxin into the shell and kernel tissues and that the toxin must be very potent. It is obvious therefore that only a few bugs moving actively about for a comparatively long period among the thickly clustered nuts can cause severe loss or damage of nuts and in fact as few as 10 or 12 bugs per tree can ruin the crop.

Plate 65.

Nuts Showing Bug Injury to the Shell.—*Top row*: Pinpoint marks, small depressions, and a large depression on the shell. *Middle row*: Partial collapse of the shell. *Bottom row*: Several small surface depressions and severe shell collapse.

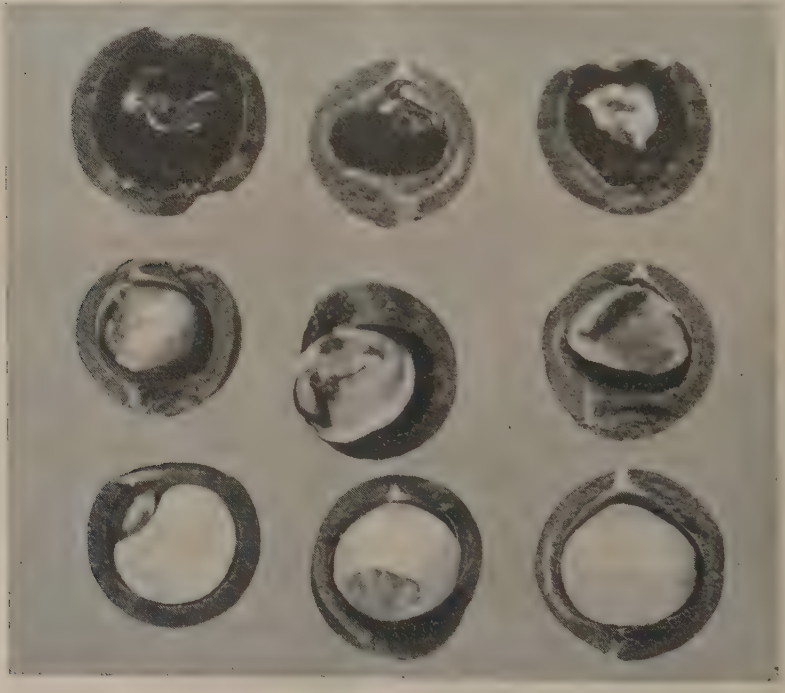


Plate 66.

Nuts Showing Bug Injury to the Kernels.—*Top row*: Shrivelled kernels and collapsed shells. *Middle row*: Partially shrunken kernels. *Bottom row*: Lightly injured kernels together with a perfect kernel.

Control.

Methods of combating the fruit-spotting bug on bananas and papaws by the use of DDT sprays should be quite suitable for bug-infested Macadamia trees. In recent years many nut growers have adopted a routine treatment for preventing the attacks of the flower caterpillar. This pest can readily be kept in check by DDT sprays applied just before or during flowering. If these treatments are applied to the whole tree, any bug on the shoots at this time will be killed and attacks on the nuts may not occur unless the insects migrate into the plantation from other hosts in the vicinity. The grower, however, should always be watchful for the bugs on the nut clusters, but as they may be few in number and escape detection they must be suspected if premature nut-fall occurs. Should, on examination, the fallen nuts show the shell or kernel damage described earlier a treatment of 0·2 per cent. DDT spray should be made and a second treatment applied a fortnight later.

It may be desirable also to survey the surrounding areas to determine whether the bugs are moving into the plantation from other hosts. If they are, then these plants should be destroyed if at all practicable or sprayed twice with DDT in the same manner as the plantation trees.

Pasture Grub Experiments.

On the Atherton Tableland there were indications last year that white grubs might be troublesome in pastures during the summer of 1947-48. It was decided, therefore, to investigate the possibility of using benzene hexachloride (BHC) for the control of this pest in pastures. The insecticide gives good control of related pests attacking cultivated crops such as sugar-cane when applied either at the time of planting or as a side-dressing later. The control problem in pastures is much more complicated, for it is not easy to get the insecticide into the soil horizon where the grubs occur.

The investigation has three phases. The first is to demonstrate the practicability of treating potential egg-laying sites on the farm so that beetles will be killed when they begin to lay their eggs. These sites are fairly well defined along fence lines, around fallen timber, and in the vicinity of Scotch (spear) thistles which flourish in areas where the grass is thin.

The second phase is to treat the known infested areas—that is, where the turf is damaged—before the spring flight, in the hope that the beetles will be destroyed as they emerge from the ground. A considerable beetle mortality usually follows such treatment.

The final phase is to destroy the white grubs in the field before the rapidly-growing larvæ move laterally and cause extensive damage.

The subject requires a long-term investigation. This was established during the spring of 1947, but results of the trials will not be available for comment for some time yet.

The Light Brown Apple Moth *

A. W. S. MAY, Entomologist, Science Branch.

DURING the latter part of the 1947-48 season, an unusually severe outbreak of the light brown apple moth occurred in the Granite Belt and both apples and grapes were affected. Though this insect has been recorded from the district for a number of years, the severity of last season's infestation raised the question of its future importance. However, since coincident outbreaks of the moth occurred in the southern States, it is probable that the severe outbreak was a purely seasonal phenomenon.

Though it is closely allied to the codling moth, the habits of this insect are quite dissimilar. It attacks a wide range of economic plants, including apples, grapes, apricots, plums and lupins, and it has been bred from several native trees and shrubs. The availability of suitable alternative hosts within the district raises the possibility that similar outbreaks may be experienced in the future should conditions favour the development of the pest. Consequently, control measures may be required and the following additions to the pest control programme may warrant consideration. However, the success of these measures on the crop is dependent to a large extent on the amount of reinfestation that may occur from moths breeding in alternative hosts.

CONTROL MEASURES.

Apples.

The larvae of the light brown apple moth are primarily leaf feeders and they shelter in webbing tunnels in leaf folds or between adjacent leaves. Unless their food supply has become exhausted they seldom wander far from their shelters, and this habit tends to render control somewhat difficult.

The normal lead arsenate or DDT cover spray schedule for codling moth control should also check this pest early in the season, but as the moth is particularly active throughout February and March the final codling moth cover spray may have been applied before the autumn brood of larvae becomes active on the trees. A spray containing .05 per cent. DDT combined with lead arsenate (3 lb. in 100 gallons water), applied in late February or early March, should serve to protect late-maturing apples. This combination spray may also be substituted for earlier DDT cover sprays if so desired.

Grapes.

Larvae may infest developing bunches in appreciable numbers. They spin their webbing between adjacent berries, and are somewhat difficult to detect as the damage is usually confined to the rinds of inside berries. Juice exuding from the damaged rinds of more forward berries furnishes ideal conditions for early mould development, and as bunches mature losses from grey mould are accentuated.

Control should be commenced before the early summer generation of caterpillars reaches maturity, and the inclusion of lead arsenate or 0.1 per cent. DDT in copper sprays used for fungus control should prove beneficial. As bunches develop and spray residues must be avoided, the application of a dust containing one part of 10 per cent. DDT dust to four parts of sulphur should further assist in the control of this pest.

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* *Tortrix postvittana* Walk.

Big Bud in Tomatoes.

J. E. C. ABERDEEN, Pathologist, Science Branch.

BIG bud disease is probably known to all regular tomato growers. It is difficult to describe the appearance of the infected plant in words, but the accompanying photograph illustrates the most common symptom and makes obvious the reason for the name of "big bud" (Plate 67). A second class of symptom seen is that known as "rosetting." In the latter case shoots normally produced in the leaf axil appear as a bunched mass of small narrow leaves. Prior to these rather obvious symptoms there is actually a cessation in growth of the stem which is often followed by a blueing of the growing tip, and the flower hands instead of curving downwards tend to point upwards. The bizarre forms leading to the name "big bud" are malformed flowers in which the stalks have thickened considerably and the flower itself become grossly distorted, while the entire hand remains a green colour.

Plate 67.

Big Bud of Tomato.

Spread of the Disease.

Usually a grower sees only an occasional plant affected with this trouble but in some districts there is a definite possibility of an appreciable economic loss. There are two important points to be noted with regard to its entry into the crop and subsequent spread:—

(1) The disease almost always enters the tomato crop from other hosts outside the crop itself.

(2) It is spread by an insect and not by handling, which is in contrast to mosaic.

On hosts other than tomato the "big bud" symptom is usually absent and the symptom common to most is that of green flowers. A rosetting effect is also fairly common. Well known plants which have been proved to be hosts in other States of Australia are weeds such as dock, nightshade, and sow thistle; and garden plants such as antirrhinum, gerbera, petunia, nasturtium, chrysanthemum, dahlia, geranium and phlox, and couch grass.

One insect has been proved to spread the disease and there may be others. The incriminated carrier is one of the leafhoppers or jassids. It is a small sucking insect approximately ¼-inch long, of a grey-brown colour with speckled wings. The presence of leafhoppers generally is readily discerned by disturbing the bushes, which causes them to dart out for a short distance and then either return or lodge in the next bush.

Control.

In the light of the above information on the spread of the disease the simplest means of control is to reduce the outside sources of infection and control the leafhopper within the crop. Complete elimination of other hosts is not possible but it is suggested that particular attention be paid to eliminating weeds on the headlands. For control of the leafhopper within the crop either 0·1 per cent. DDT spray or 2 per cent. DDT dust may be used. While the insect is prevalent, treatments will need to be repeated approximately every 10 days. It is unlikely that treatment need commence before November in southern Queensland, but it is recommended that the grower take good note of the leafhopper population in the adjacent weed areas. If this is high and there are indications that the weed growth may die off due to dry conditions or otherwise, then dusting or spraying will need to commence earlier. The removal and destruction of diseased plants as soon as detected should also assist in reducing the spread, but it should be realised that the plant is actually infected at least three weeks before the appearance of the noticeable symptoms.

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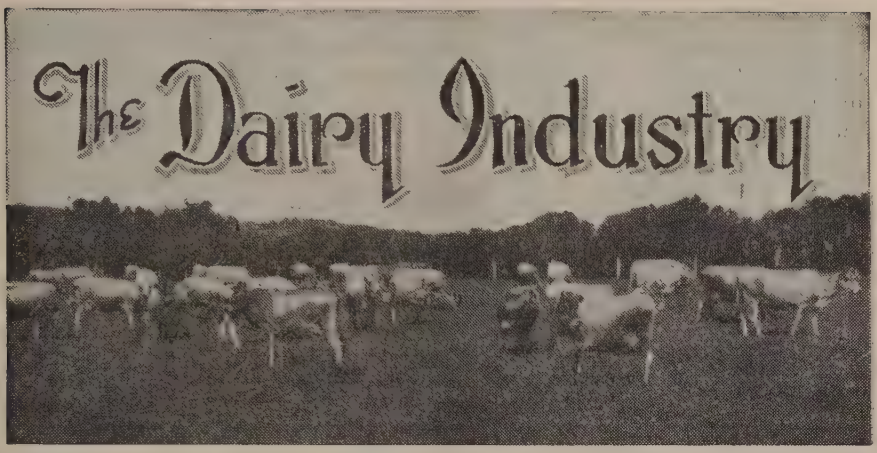


What Herd Recording Shows.

L. VERNEY, Division of Dairying.

IT is a recognised fact that dairy farming is a business, and should be run on business principles; nevertheless, on many dairy farms throughout the State one of the chief underlying principles of business—record keeping—is sadly neglected. Even when the dairy herd is the chief source of income, many dairy farmers do not keep accurate herd records. The keeping of these records requires a certain amount of time and labour, but it must be conceded that their value far exceeds the outlay and without them the highest type of dairy farming is rendered impossible.

Some of the reasons why the production of dairy herds should be recorded are:—

(*a*) It is the only way to find out what each cow actually pays for the feed provided, and the time expended in obtaining the milk she gives; it is the shortest way to build up a profitable herd of dairy cows.

(*b*) It enables the elimination of low producers to be carried out, and at the same time reveals the best cows from which heifer calves can be raised.

(*c*) It increases the sale value of good cows and, where pure bred recording is carried out, enables the breeder to sell bull calves from the high producing cows at attractive prices.

(*d*) It enables the dairy farmer to compare records of daughters with dams and to check up on the sire he is using.

(*e*) Where the herd is hand-fed in addition to pasturage it gives guidance as to how much each individual cow needs and furnishes helpful information for planning the feed crop rotations.

(*f*) It puts dairying on a sound business basis.

(*g*) It encourages increased pride and interest in the care of the dairy herd.

(*h*) It points out, and so helps to correct, sources of loss in dairying.

(*i*) It cuts out all guesswork.

(*j*) Better cows mean more profitable cows.

Many dairy farmers try to keep a larger herd on the principle of reducing overhead cost per unit of livestock. In following this line of unsound reasoning to the logical conclusion, they have developed their herds out of all proportion to their feed production and capital expenditure—in some cases to such an extent that they continually find themselves handicapped by a shortage of feed and funds. Consequently the low production of many cows is due largely to the low yield of both pastures and feed.

Owing to the lack of business training, many farmers assume that more cows will produce more milk. For example, they assume twelve cows produce more milk than ten cows. Now, if the supply of available feeds is limited to a fixed amount, and twelve cows would only have what the ten cows could just as well consume within the year, then it stands to reason that the twelve cows could be less profitable than the ten on account of the nutrients needed for the growth and maintenance of 20 per cent. additional cows, young stock included, and a waste of labour in like proportion.

The production recording of dairy cows provides information basic to successful dairy farming, and stimulates interest and gives a wider appreciation of the business side of the farmer's occupation.

Information on all matters appertaining to herd recording is available from the Department of Agriculture and Stock.

Plate 68.

A British Guernsey type recently acquired by the National Institute for Research in Dairying at Reading, England.

Pure-bred Herd Recording for 1947-48.

S. E. PEGG, Senior Adviser (Herd Recording).

THE recording of pure bred cows showed a slight increase over the 1946-47 season, as 884 cows were due to complete their records compared with 708 for the preceding year.

Table 1 gives the number of cows in each breed which were due to complete their lactation during the year.

TABLE 1.

Breed.	Total.	Passed.	Failed.	Withdrawn.
A.I.S.	338	156 (46·1%)	70 (20·7%)	112 (33·1%)
Jersey	492	242 (49·2%)	116 (23·6%)	134 (27·2%)
Guernsey	36	16 (44·4%)	8 (22·2%)	12 (33·3%)
Ayrshire	18	7 (38·9%)	6 (33·3%)	5 (27·8%)
Friesian	Nil	..	..	..
Total	884	421	200	263
Percentage	..	47·6	22·6	29·7

It will be noticed that only 47·6 per cent. of the cows submitted reached the required standard.

The production records shown in Table 2 were established during the year.

TABLE 2.

Breed.	Age.	Days.	Owner.	Cow.	Milk lb.	Butter Fat lb.
A.I.S...	S2	273	J. Phillips and Sons	Sunnyview Beauty 6th	16,577	733
Jersey..	Mature	273	W. S. Conochie ..	Brooklands Cunning Drop	12,800	752
Guernsey	J3	273	W. A. K. Cooke ..	Bangalow Vale Vanity Fair 3rd	9,664	465
Guernsey	M	273	W. A. K. Cooke ..	Laureldale Vida ..	12,473	563
Guernsey	J3	365	W. A. K. Cooke ..	Laureldale Pamela	11,698	569

Table 3 shows the average production for each age group of each breed.

PURE BRED DAIRY CATTLE PRODUCTION RECORDING SCHEME.

BREED PRODUCTION AVERAGES FOR REGISTERED HERD BOOK STOCK WHICH COMPLETED LACTATION RECORDS OF 273 DAYS DURING THE YEAR ENDING 30TH JUNE, 1948.

	Ages of Groups.							
	J2.	S2.	J3.	S3.	J4.	S4.	Mature.	All Ages.
Jersey.								
Number of Cows	113	38	36	28	24	19	100	358
Average—								
Milk lb.	4,988	5,767	6,066	5,904	7,150	6,965	7,112	6,068
Butterfat lb.	263	300	325	315	346	381	374	320
Test %	5·27	5·2	5·36	5·33	4·84	5·47	5·26	5·27
Australian Illawarra Shorthorn.								
Number of Cows	41	43	32	26	18	11	55	226
Average—								
Milk lb.	6,849	7,347	8,466	9,062	9,313	10,094	9,444	8,413
Butterfat	266	296	346	361	370	392	373	335
Test %	3·88	4·03	4·09	3·98	3·97	3·88	3·95	3·98
Guernsey.								
Number of Cows	1	5	5	..	2	1	10	24
Average—								
Milk lb.	6,326	5,597	7,185	..	7,705	5,391	7,727	7,013
Butterfat lb.	319	274	349	..	398	283	375	344
Test %	5·04	4·89	4·86	..	5·16	5·25	4·85	4·9
Ayrshire.								
Number of Cows	2	1	2	4	..	1	3	13
Average—								
Milk lb.	6,646	5,456	6,058	7,132	..	7,561	8,826	7,187
Butterfat lb.	307	212	243	310	..	276	401	310
Test %	4·62	3·88	4·01	4·34	..	3·65	4·54	4·31

Plate 69.

The Great Dividing Range from the Kingpah Paddocks, West Moreton, Queensland.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the advanced register of the A.I.S., Guernsey and Jersey Societies' Herd Books, production records for which have been compiled during the months of June, July, August, and September, 1948. (273 days unless otherwise stated.)

Animal.	Owner.	Milk Production.	Butter Fat.	Sire.	Month Compiled.
		Lb.	Lb.		
AUSTRALIAN ILLAWARRA SHORTHORN.					
MATURE COW (STANDARD 350 LB.).					
Fairlie Favourite 33rd (365 days)	Mitchell and Mulcahy, Rosenthal, Warwick	13,018·95	559·29	Rosenthal Perfection	June
Rozana Jason's Laurel	T. McLennan, Willowvale, *via* Warwick	11,898·6	461·113	Chelma Jason	June
Trevor Hill Blanche	G. Gwynne, Umbiram	10,609·45	427·149	Rosenthal Musketeer	June
Chelmer Nancy	T. McLennan, Willowvale, *via* Warwick	10,352·35	359·143	Thornleigh Young Lochinvar	June
Tabbagong Beauty 30th	J. Phillips, Wondai	17,628·35	638·348	Parkview Royalist	July
Glen Idol Florrie 7th	Estate P. Doherty, Glen Idol, Gympie	12,667·8	474·536	Blacklands Count	July
Glen Idol Daphne 6th	Estate P. Doherty, Gympie	11,759·75	465·663	Blacklands Count	July
Yarranvale Annabelle	W. Henschell, Yarranlea	10,926·02	443·072	Trevor Hill Bosca	July
Glen Idol Florrie 8th	Estate P. Doherty, Gympie	11,364·25	439·614	Blacklands Banker	July
Trevor Hill Caramel	G. Gwynne, Umbiram	9,079·04	437·081	Corunna Supreme	July
Yarranvale Melva	W. Henschell, Yarranlea	9,832·21	403·024	Trevor Hill Bosca	July
Ennismore Bud	E. W. Jackson, Nobby	10,371·2	398·728	Navillus Prince Henry	July
Jamberoo Glory 6th	Hart Bros., Clifton	10,989·95	351·054	Valiant of Greyleigh	July
Blacklands Ethel 22nd	A. Pickels, Proston	12,592	455·546	Blacklands Admiral	September
Sunnycrest Tulip	A. H. Sokoll, Wondai	9,595·75	394·56	Glebe Wallace 2nd	September
Barwin Lavender 4th	G. Meyers, Inbil	9,563·4	366·506	Blacklands Ethel's Viceroy	September
Bunya View Susy	W. J. Horrocks, Maclagan	8,239·85	362·458	Trevor Hill Reflection 143rd	September
Ardilea Kitty 5th	W. Hinrichsen, Clifton	9,385·75	357·224	Newstead Reliance	September
SENIOR, 4 YEARS (STANDARD 330 LB.).					
Alfa Vale Queenie (365 days)	W. H. Thompson, Nanango	17,028·35	658·324	Reward of Fairfield	June
Tara Plumber's Flower	C. K. Roche, Wheatvale	9,951·05	402·499	Alfa Vale Plumber	June
Jamberoo Marjorie 10th	Hart Bros., Clifton	11,160·95	437·811	Murray Bridges Flowers Prince	July
Fairthorn Pidgeon 12th	H. G. Watson, Killarney	8,214·9	368·893	Parkview Red Prince	July
Blacklands Lady Jean 25th	A. Pickels, Proston	10,932·25	368·396	Blacklands Czar	July
Tara Plumbers Flower (347 days)	C. K. Roche, Wheatvale	11,728·1	489·940	Alfa Vale Plumber	August
Melmerle Velvet 8th	C. K. Roche, Wheatvale	7,885·1	350·406	Rhodesview Primroy	August
Sunnyview Kitty 11th	A. Lohse, Biggenden	9,652·2	365·541	Sunnyview Kitchener	September
JUNIOR, 4 YEARS (STANDARD 310 LB.).					
Ennismore Freda	E. W. Jackson, Ennismore, Nobby	10,003·95	417·712	Navillus Prince Henry	June
Ennismore Florrie	E. W. Jackson, Ennismore, Nobby	9,710·1	383·902	Navillus Prince Henry	June
Arolla Polly 8th	J. Crookey, Allora	7,783·1	325·304	Parkview Highbrow	July
Cedar Valley Rosebud	A. C. Marquardt, Mondure	8,584·1	329·852	Kyabram Masterpiece	August
Balatar Maud	T. W. Fowler, Felton	8,297·62	329·767	Fairvale Dairyman	August
Bantry Sally	D. Sullivan, Bantry	10,090·16	415·061	Rosenthal Surplus 2nd	September
Bunya View Thelma's Pride	W. D. Davis, Wambo	8,447·55	370·358	Bingleigh Royal	September

Senior, 3 Years (Standard 290 lb.).

Eachamvale Beauty	J. K. English, Malanda	10,740·78	428·01	Cedar Grove Commodore	June
Bantry Bonny	D. Sullivan, Rosevale, Pittsworth	9,782·91	363·041	Rosenthal Surplus 2nd	June
Valera Sheila 12th (246 days)	Sullivan Bros., Pittsworth	8,431·5	334·231	Alfa Vale Pride 2nd	June
College Rainbow 4th	Queensland Agricultural High School and College, Lawes	9,227·8	366·080	Alfa Vale Pride 3rd	July
Chelmer Lulu 3rd	H. F. Marquardt, Wondai	7,855·65	294·742	Chelmer Champions Renown	August
Sunnycrest Princess	A. Sokoll, Wondai	8,273·35	336·356	Glebe Wallace 2nd	September

Junior, 3 Years (Standard 270 lb.).

Sunny View Evelyn 13th	J. Phillips and Sons, Wondai	12,088·7	466·641	Sunny View Commodore	June
Boah Peak Ruby 6th	H. L. and C. I. Bruggemann, Kulpi	7,045·35	313·330	Fairvale Musketeer	June
Bileena Chance 6th	C. K. Roche, Wheatvale, *via* Warwick	8,174·35	282	Tara Governor	June
Alva Glen Sparkle	D. Birch, Memerambi	9,556·5	354·799	Alva Glen Lovely's Reward	July
Glen Idol Countess 4th	Estate P. Doherty, Gympie	8,359·4	343·190	Blacklands Count	July
Fairvale Fuschia 8th	K. Berghofer, Westbrook	7,707·06	329·437	Fairvale Reward	July
Alva Glen Lovely's Spot	D. Birch, Memerambi	8,072·3	317·657	Alva Glen Lovely's Reward	July
Beaury Flirt 7th	A. F. Campbell, Killarney	6,931	280·681	Carribee Aviator	July
Fairvale Jean 12th	K. Berghofer, Westbrook	7,201·59	275·511	Bingleigh's Jean's Monarch	July
Fairvale Laurel 3rd	H. L. and C. I. Bruggemann, Kulpi	6,882·75	298·126	Fairvale Reward	August
Valera Fairy 6th	D. Sullivan, Bantry	8,717·96	360·021	Alfa Vale Pride 2nd	September

Senior, 2 Years (Standard 250 lb.).

Fairvale Opal 4th	H. L. and C. I. Bruggemann, Kulpi	8,054·9	338·937	Bingleigh Jean's Monarch	June
Ardilea Velvet 2nd	Hinrichsen and Sons, Clifton	7,073·65	321·066	Newstead Reliance	June
Merrivale Pretty 6th	Estate W. Soley, Malanda	7,279·7	308·740	Alfa Vale Felix	June
Bileena Chance 7th	C. K. Roche, Wheatvale, *via* Warwick	7,960·2	295·531	Tara Governor	June
Ennismore Beauty	E. W. Jackson, Nobby	6,366·8	257·101	Navillus Prince Henry	June
Sunnyview Little Princess 8th	J. Phillips and Sons, Wondai	12,697·6	502·839	Sunnyview Commodore	July
Millievale Jeanette	A. H. Webster, Stockyard Creek, *via* Helidon	9,556	456·962	Fairvale Victor	July
Beaury Grace	A. Campbell, Killarney	8,065·3	332·749	Dulcamah Monash	July
Beaury Red Lily 22nd	A. Campbell, Killarney	6,986·3	298·382	Dulcamah Monash	July
Glen Idol Fairy 15th (256 days)	Estate P. Doherty, Gympie	7,495·25	288·281	Blacklands Count	July
Lynfield Pearl 2nd	D. Birch, Memerambi	7,700·8	281·167	Blacklands Spotlight	July
Merrivale May 13th	Estate W. Soley, Malanda	7,066	272·937	Alfa Vale Noel	July
Lynfield Model 6th	D. Birch, Memerambi	7,306·95	266·998	Blacklands Spotlight	July
Alfa Vale Star 15th (365 days)	W. H. Thompson, Nanango	11,941·75	525·096	Alfa Vale Stalin	August
Navillus Norma 2nd	T. W. Fowler, Felton	6,342·37	260·74	Alfa Vale Re Nell	August
Bantry Maiden	D. Sullivan, Bantry	7,952·86	339·658	Rosenthal Surplus 2nd	September
Yarranvale Twinkle	K. Berghofer, Athol	8,182·2	328·372	Sunnyview Landmark	September
Bunya View Thelma 11th	W. J. Horrocks, Maclagan	7,148·05	312·645	Trevor Hill Reflection 143rd	September
Barwin Irene 2nd	G. Meyers, Imbil	7,193·65	282·176	Blacklands Young Czar	September

Junior, 2 Years (Standard 230 lb.).

Alfa Vale Model 30th	W. H. Thompson, Nanango	8,524·65	366·272	Alfa Vale Paisley	June
Mountain Camp Miss Thelma	Madge Bros., Southbrook	7,468·75	282·327	Newstead Bell Boy	June
Sunny View National Lady 2nd	J. Phillips and Sons, Wondai	12,520·80	489·748	Sunny View Kitchener	July
Bunya View Thelma 13th	W. D. Davis, Wambo	7,671·85	348·017	Trevor Hill Progress	July
Bunya View Thelma 14th	W. D. Davis, Wambo	7,370·75	305·785	Trevor Hill Progress	July
Rhodesview Nancy 75th	V. R. Nugent, Murgon	7,080·7	289·551	Fairvale Major	July
College Thorn 7th	Queensland Agricultural High School and College, Lawes	6,737·4	280·481	Alfa Vale Pride 3rd	July

Production Recording—*continued.*

Animal.	Owner.	Milk Production.	Butter Fat.	Sire.	Month Compiled.
		Lb.	Lb.		
AUSTRALIAN ILLAWARRA SHORTHORN.					
JUNIOR, 2 YEARS (STANDARD 230 LB.)—*continued.*					
Mount Camp Miss Thelma 3rd	Madge Bros., Southbrook	6,564·22	252·184	Newstead Bell Boy	July
Faimoye Butterfly 2nd	C. K. Roche, Wheatvale	6,239·35	251·127	Sunbridge Regent	July
Bingleigh Molly 18th	J. C. Meier, Mount Mort	8,007·1	343·903	Blacklands Emblem	August
Valera Una 7th	Sullivan Bros., Pittsworth	7,790·43	304·206	Alfa Vale Pride 2nd	August
Cloverdale Doreen 3rd	Mrs. A. E. Powell, Chinchilla	6,342·35	250·08	Haroldale Barrister	August
Wenlock Redwing	H. G. Watson, Killarney	6,011·9	234·850	Alfa Vale Reaper	August
Ardilea Cherry 2nd	W. Hinrichsen and Sons, Clifton	7,657·55	327·874	Newstead Reliance	September
Arolla Beauty 13th	J. Crookey, Allora	7,669·3	315·615	Fairthorn Rainbow's Prince	September
Bunya View Duchess 6th	W. D. Davis, Wambo	7,633·3	308·138	Trevor Hill Progress	September
Yarranvale Gloria	K. Berghofer, Athol	6,835·65	298·330	Sunnyview Royal National	September
Yarranvale Royal Kitty	K. Berghofer, Athol	6,775·35	283·390	Sunnyview Royal National	September
Rhodesview Flossie	K. Berghofer, Athol	6403·8	257·599	Rhodesview Royal Lad 2nd	September
Grahamville Sapphire	W. J. Horrocks, Maclagan	6,478·2	242·295	Whitepark Ronald	September
Springlea Pretty Jean 3rd	J. E. Heath, Murgon	6,377·9	241·697	Alne Bank Wisdom	September
Bunya View Thelma 16th	A. C. Marquardt, Mondure	6,250·35	238·064	Trevor Hill Progress	September
Arolla Beauty 12th	J. Crookey, Allora	6,271·3	237·23	Fairthorn Rainbow's Prince	September
JERSEY.					
MATURE COW (STANDARD 350 LB.).					
Westwood Fairy Queen	F. Porter, Cambroon	8,846·6	499·586	Hunstrete Emperor's Volunteer (imp.)	June
Gem Lula	W. Bishop, Kenmore	9,088·35	484·031	Bulby Oxford Gamboge	June
Upwell Francis Fawn	B. T. Seymour, Upwell, Kapaldo	8,433·38	476·414	Upwell Noble Pioneer	June
Brookland Choice Rose	W. S. Conochie, Sherwood	8,275·65	452·638	Brooklands Choice Peer	June
Trecarne Chimes 5th	T. Petherick, Lockyer	8,022·2	447·06	Jerseylea Golden Duke	June
Glenrandle Fairette	P. Kerlin, Killarney	7,281·7	442·623	Bellgarth Stylish	June
Upwell Grey Guest	B. T. Seymour, Upwell, Kapaldo	7,685·75	422·862	Lindley Prince	June
Upwell Centum	B. T. Seymour, Kapaldo	7,624·75	420·379	Lindley Prince	June
Kathleigh Coronation	R. J. Crawford and Sons, Inverlaw	7,596·6	409·515	Banyule Senior	June
Glenrandle Hazeldale	P. Kerlin, Killarney	6,657·4	401·911	Bellgarth Stylish	June
Gem Mavis (236 days)	W. Bishop, Kenmore	7,997·15	389·189	Calton Lothean	June
Kathleigh Mist	R. J. Crawford and Sons, Inverlaw	6,850·05	388·03	Retford King's Thorn	June
Trecarne Jersey Hope	T. Petherick, Lockyer	6,536·05	368·685	Trecarne Some Duke	June
Trecarne Daffodil 2nd	W. P. Harmer, Golden View, Palen Creek	6,913·51	360·103	Brampton Daffodil's Peer	June
Glenview Moonlight	F. Z. Eager, Petrie	8,042·05	354·3	Trinity Governor's Hope	June
Trecarne Some Eileen	T. Petherick, Lockyer	6,934·95	353·822	Trecarne Some Duke	June
Westwood Heather	F. Porter, Cambroon, *via* Maleny	7,803·7	477·624	Westwood Palatines Volunteer	July
Kathleigh Mischief	R. J. Crawford and Sons, Inverlaw	6,582·5	465·805	Oxford Daffodil's Victor	July
Sunnyglen Mayflower	J. McCarthy, Budgee, *via* Greenmount	8,868·35	458·438	Ivy Bank Marquis	July
Kathleigh Mist (amended)	R. J. Crawford and Sons, Inverlaw	6,995·65	414·896	Retford King's Thorn	July
Boree Daffodil	W. and C. Tudor, Branch Creek	8,597·93	413·657	Maurfield Larkspur's Gift	July

Romsey Blossom	J. Wilton, Killarney	7,148·3	385·003	Oxford Dainty Peer	July
Boree Belle	W. and C. Tudor, Branch Creek	7,764·22	380·222	Maurfield Larkspur's Gift	July
Englebourne Gem	M. May, Hermitage, *via* Warwick	7,452·65	371·948	Oxford Rosina's Bert	July
Tecoma Brown Bird	A. Semgreen, Coolabunia	6,785·9	370·35	Oxford Asteroid	July
Trecarne Attractive	V. Granger, Nerang	6,776·9	367·254	Jerseylea Golden Duke	July
Boree Countess	W. and C. E. Tudor, Gayndah	9,030·2	453·081	Maurfield Larkspur's Gift	August
Westbrook Sylvia 16th	V. Dunstan, Wolvi	8,579·4	429·508	Mornmoot Clementines Valour	August
Boree Cute Lily	W. and C. E. Tudor, Gayndah	8,512·34	419·677	Trinity Cute Commodore	August
Windsor Princess Dinah	H. G. Johnson, Beaudesert	8,612·5	402·876	Bobs of Wingate	August
Palm Ridges Sylvina	H. Sigley, Jaggan	10,022·9	588·457	Overlook Financier	September
Romsey Joyful Maid	J. Wilton, Killarney	6,632	358·311	Oxford Dainty Peer	September
Lawnview Belle	V. Dunstan, Wolvi	6,583·2	352·382	Oxford Buttercups Peer	September

SENIOR, 4 YEARS (STANDARD 330 LB.).

Brookland Merry Primula	W. S. Conochie, Sherwood	8,210·9	495·352	Bulby Maria's Keepsake	June
Myrtledale Depants	H. Sigley, Jaggan	7,836·95	464·974	Oxford Remus Count	June
Carnation Miss	O. W. Spresser, Ipswich	6,255·05	350·691	Avondale Barleycorn's Golden Escort	June
Brooklands Cream Flake	W. Conochie, Sherwood	6,427·95	428·428	Englorie Cunning Victor	July
Austral Park Coronation Cowslip	A. Semgreen, Coolabunia	7,409·4	409·036	Austral Park Coronation Oxford	July
Westbrook Tulip 136th	Farm Home for Boys, Westbrook	6,859·6	347·524	Mornmoot Clementine's Valour	July
Boree Cute Christmas	W. and C. E. Tudor, Gayndah	8,628·54	414·419	Trinity Cute Commodore	August
Nairfale Princess Beth	R. G. Browne, Yangan	6,823·2	333·833	Nairfale Noble Count	August
Inverlaw Dainty Model	R. J. Crawford and Sons, Kingaroy	6,925·6	388·845	Oxford Royal Lad	September
Grasmere Majestic Samaritaine	M. May, Hermitage	6,071	352·882	Navua Victorious Samaritan	September

JUNIOR, 4 YEARS (STANDARD 310 LB.).

Brookland Merry Jingle Belle	W. S. Conochie, Sherwood	8,823·15	497·07	Bulby Maria's Keepsake	June
Romsey Stylish Hope	J. Wilton, Killarney	7,186·4	364·596	Bellgarth Stylish	July
Westbrook Golden Bread 8th	Farm Home for Boys, Westbrook	7,183·85	323·226	Mornmoot Clementine's Valour	July
Glenrandle Lucy	D. Kerlin, Killarney	7,215·7	365·008	Bellgarth Glory King	August
Boree Cute Lilac	W. and C. E. Tudor, Gayndah	6,951·4	356·602	Trinity Cute Commodore	August
Trinity Cute Dream	D. R. Hutton, Cunningham	6,445·2	332·112	Samares Cute Prince 3rd	September

SENIOR, 3 YEARS (STANDARD 290 LB.).

Trecarne Pealing 4th	C. Huey, Ashview, Sabine	6,281·9	328·960	Trecarne Some Duke	June
Brooklands Angel Cake	W. S. Conochie, Sherwood	6,279·55	390·892	Bulby Maria's Keepsake	July
Riveria Ivy Pride	J. Sigley, Millaa Millaa	6,643·4	363·156	Navua Designing Star	July
Boree Gift's Queen	W. and C. E. Tudor, Gayndah	8,098·6	404·359	Maurfield Larkspur's Gift	August
Lermont Silver Bell 2nd	J. J. Ahern, Conondale	6,252·4	390·166	Selsey Samares Hallmark	August
Boree Bravo's Model	W. and C. E. Tudor, Gayndah	7,767·29	380·55	Boree Bravo	August
Boree Gift's Marvel	W. and C. E. Tudor, Gayndah	7,985·55	359·412	Maurfield Larkspur's Gift	August
Westbrook Starbright 8th	Farm Home for Boys, Westbrook	6,420·55	320·106	Selsey Royal Standard	August
Gem Ingrid	W. Bishop, Kenmore	7,781·58	420·707	Bulby Oxford Gamboge	September

JUNIOR 3 YEARS (STANDARD 270 LB.).

Nairfale Likeness	R. J. Browne, Yangan	8,684·8	423·422	Nairfale Golden Recorder	June
Nairfale Lena	R. J. Browne, Yangan	7,382·2	383·699	Nairfale Golden Reality	June
Westbrook Starbright 7th	Farm Home for Boys, Westbrook	6,393·2	346·384	Selsey Royal Standard	June
Englebourne Nixey	M. May, Hermitage, *via* Warwick	6,826·2	339·725	Oxford Floss' Remus	June
Pinegrove Victory	J. W. Evans, Rosewood	5,876·6	311·403	Roseview Peer	June
Westbrook Starbright 9th	Farm Home for Boys, Westbrook	6,752·95	308·091	Mornmoot Clementine's Valour	June
Nairfale Mayday	R. J. Browne, Yangan	5,563·9	279·657	Nairfale Count's Paymaster	June
Trecarne Bright Tot	T. Petherick, Lockyer	5,041·2	279·488	Trecarne Ruler 2nd	June
Inverlaw Governess	R. J. Crawford and Sons, Inverlaw	7,304·1	403·56	Trinity Governor's Hope	July

PRODUCTION RECORDING—*continued.*

Animal.	Owner.	Milk Production.	Butter Fat.	Sire.	Month Compiled.
		Lb.	Lb.		
JERSEY.					
JERSEY, 3 YEARS (STANDARD 270 LB.)—*continued.*					
Brooklands Merry Prudence	W. Conochie, Sherwood	6,670·05	394·801	Bulby Maria's Keepsake	July
Ashview Hope	C. Huey, Ashview, Sabine	5,437·3	287·359	Trecarne Victor 4th	July
Lermont Locketette 3rd	J. Schull and Sons, Oakey	5,050·05	278·295	Trinity Noble Effort	July
Boree Cute Buttercup	W. and C. E. Tudor, Gayndah	8,246·96	393·549	Trinity Cute Commodore	August
Boree Cute Charm	W. and C. E. Tudor, Gayndah	8,079·18	373·868	Trinity Cute Commodore	August
Burnlea Gracious	A. E. Trigger, Didcot	5,843·25	283·666	Burnlea Aviator 4th	August
Mayfair Countess	J. W. Carpenter, Helidon	5,633·05	361·568	Lermont Double Volunteer	September
Fauvic Fidget	W. J. Blair, Cooroy	7,162·4	323·214	Brooklands Big Ben	September
Lermont Bellette 3rd	J. Schull and Sons, Oakey	4,834·85	310·102	Lermont Ambassador	September
SENIOR, 2 YEARS (STANDARD 250 LB.).					
Carnation Hope's Hazelette	O. W. Spresser, Ipswich	7,603	389·675	Bellgarth Glory King	June
Boree Cute Melody	W. and C. E. Tudor, Branch Creek	7,218·56	346·926	Trinity Cute Commodore	June
Nairfale Trinket	R. J. Browne, Yangan	6,113·6	333·446	Nairfale Count's Prominence	June
Trecarne Dairy Queen 3rd	T. Petherick, Lockyer	6,550·7	310·8	Trecarne Some Duke	June
Kinross Princess Rene	H. R. Randall, Woowoonga	5,486·50	308·774	Trinity Royal Prince	June
Lermont Lynette 3rd	J. McCarthy, Glen Erin, Greenmount	5,039·9	297·518	Trinity Noble Effort	June
Linden Grove Design's Lily	H. Cochrane, Kin Kin	5,257·5	288·464	Navua Hamlet's Designer	June
Windsor Princess Leda	L. E. Harmer, Beaudesert	5,440·8	274·121	Bobs of Wingate	June
Inverlaw Mauve Daisy	R. J. Crawford and Sons, Inverlaw	5,254·5	254·903	Oxford Royal Lad	June
Brooklodge Bright	T. Ahern, Conondale	6,138·7	374·792	Trecarne Some Victor	July
Lawnview Helen	V. Dunstan, Wolvi, Kin Kin	6,228·65	359·649	Oxford Maxie	July
Mayfair Bell 3rd	J. W. Carpenter, Flagstone Creek, *via* Helidon	5,190·3	302·874	Lermont Double Volunteer	July
Somersby Pride	H. R. Randall, Woowoonga	6,439·2	298·636	Trinity Dreaming Lad	July
Ashview Graceful	C. Huey, Ashview, Sabine	4,668·9	270·373	Trecarne Victor 4th	July
Ashview Connie	C. Huey, Ashview, Sabine	5,999·15	267·782	Trecarne Victor 4th	July
Nairfale Gentle	R. J. Browne, Yangan	5,375·3	263·054	Nairfale Golden Recorder	July
Wyreene Mermaid	J. A. Smith, 16 Mile Creek	4,485·6	254·361	Wyreene Boutilliere	July
Gem Norelle	W. Bishop, Kenmore	6,947·25	327·371	Gem Valour	August
Somersby Daffodil	H. R. Randall, Woowoonga	6,165·35	300·887	Trinity Dreaming Lad	August
Hocknell Volunteer Ginger Cake	L. E. Harmer, Beaudesert	5,546·1	269·431	Navua Sporting Volunteer	August
Gem Primrose 2nd	L. E. Harmer, Beaudesert	6,047·95	269·156	Gem Valour	August
Somersby Daisy	H. R. Randall, Woowoonga	6,202·45	257·298	Trinity Dreaming Lad	August
Somersby Glory	H. R. Randall, Woowoonga	5,982·75	251·205	Trinity Dreaming Lad	August
Burnlea Matilda	A. E. Trigger, Didcot	5,815·25	320·117	Woodside Rochette's Monarch	September
Kenilworth Diadem	I. J. L. Evans, Cooroy	6,008·7	304·690	Rosevale War Bond	September
Inverlaw Miss Patty	R. J. Crawford and Sons, Kingaroy	4,447·5	283·732	Inverlaw Councillor	September
Sunny Glen Empress 4th	J. McCarthy, Budgee	5,004·25	280·914	Ashfield Quality Boy	September
Inverlaw Royal Darling	R. J. Crawford and Sons, Kingaroy	4,860·25	277·059	Oxford Royal Lad	September
Burnlea Heather	A. E. Trigger, Didcot	4,966·45	274·715	Woodside Rochette's Monarch	September

Junior, 2 Years (Standard 230 lb.).

Bellgarth Bluebird	P. Kerlin, Killarney	5,932·5	332·226	Bellgarth Victory	June
Minidong Maid	R. J. Browne, Yangan	6,240·7	327·151	Balwyn Fancy's Baron	June
Trecarne Dairy Queen	T. Petherick, Lockyer	5,525·3	320·228	Trecarne Some Duke	June
Nairfale Idols Delight	R. J. Browne, Yangan	5,710	309·745	Nairfale Golden Record	June
Myrtledale Sea Shore	H. Sigley, Jaggan	5,128·25	297·591	Oxford Remus Count	June
Oxford Comtesse	E. Burton and Sons, Oxford, Wanora	5,531	295·547	Oxford King Peter	June
Brooklands Regal Laurel Leaf	W. S. Conochie, Sherwood	5,160·75	291·25	Brooklands Regalia	June
Inverlaw Birdie	R. J. Crawford and Sons, Inverlaw, Inverlaw	5,834	290·236	Oxford Royal Lad	June
Rosehill Peace	G. V. Tilley, Rosalie, Beaudesert	5,060·55	279·195	Carnation Bangle's Victory	June
Fauvic Jollity	H. Cochrane, Fauvic, Kin Kin	4,879·25	274·881	Fauvic Joker	June
Tecoma Flora	A. Semgreen, Coolabunia	5,272·8	266·669	Glenview Royal Chief	June
Oxford Lurline	E. Burton and Sons, Oxford, Wanora	5,496·45	263·348	Glenside Golden Victory	June
Inverlaw Lucy's Locket	R. J. Crawford and Sons, Inverlaw	4,118·4	256·121	Oxford Royal Lad	June
Carnation Bluebell	O. W. Spresser, Ipswich	4,694·45	254·185	Oxford Fawn's Victor	June
Myrtledale Silver Links	C. J. McKell, Jaggan	4,697·85	252·343	Palm Ridges Golden Victory	June
Carnation Maiden	O. W. Spresser, Ipswich	4,482·25	249·441	Rosslyn Royal Trigger	June
Trinity National Victory	N. C. Webb, Hocknell, Beaudesert	5,922·3	238·101	Trinity National Victory	June
Rosslyn Beauty's Keepsake	C. C. Courtman, Corinda	8,013·75	397·186	Bulby Maria's Keepsake	July
Trinity Golden Duchess 3rd	J. J. Ahern, Conondale	5,614·5	361·154	Samares Cute Prince	July
Windsor Royal Beatrice	H. G. Johnson, Gleneagle	6,279·1	311·712	Brookland Merry Monarch	July
Oxford Regal Maid	E. Burton and Sons, Wanora	5,627·85	300·313	Brookland Regalia	July
Connemara Royal Chimes	J. Ahern, Conondale	4,308·25	291·405	Trecarne Golden King 2nd	July
Lermont Starlight	J. Schull and Sons, Oakey	4,967·95	240·946	Trinity Graceful Duke	July
Oxford Eileen	F. C. Leschke, Delrose, Wanora	4,710·35	233·727	Oxford King Peter	July
Minidong Maid (365 days)	R. J. Browne, Yangan	7,489·7	405·884	Balwyn Fancy's Baron	August
Boree Cute Crystal	W. and C. E. Tudor, Gayndah	6,898·56	342·074	Trinity Cute Commodore	August
Somersby Violet	H. R. Randall, Woowoonga	6,186·5	287·853	Trinity Dreaming Lad	August
Brooklodge Sparkle	J. J. Ahern, Conondale	4,978·35	278·781	Trinity Mighty Prince	August
Oxford Falora	L. Oxenford, Oxenford	5,024·45	272·485	Glenside Golden Victory	August
Parkview Pearl	H. T. W. Barker, Oakey	4,367·25	260·143	Westbrook Valour 7th	August
Oxford Marcelle	L. Oxenford, Oxenford	4,740·05	257·279	Oxford King Peter	August
Tecoma Leah	A. Semgreen, Coolabunia	4,887·4	254·958	Glenview Royal Chief	August
Hocknell Bravo Sybil	N. C. Webb, Beaudesert	4,734·3	242·942	Navua Victoire Lad	August
Kingsford Anna	V. Dunstan, Wolvi	5,108·45	241·053	Oxford Topher	August
Brooklodge Bliss (252 days)	J. J. Ahern, Conondale	6,434·3	330·357	Trinity Mighty Prince	September
Oxford Brown Maid	J. Wilton, Killarney	5,421·6	280·603	Oxford King Peter	September
Oxford Regal Carolyn	V. Granger, Nerang	4,910·5	277·654	Brooklands Regalia	September
Fauvic Glow Worm	W. J. Blair, Cooroy	4,836·25	276·696	Fauvic Comet	September
Inverlaw Moonbeam	H. Sigley, Jaggan	4,253·55	241·691	Inverlaw Royal George	September
Parkview Velvet Tottie	H. W. Barker, Oakey	5,173	236·862	Westbrook Valour 7th	September

GUERNSEY.

Mature Cow (Standard 350 lb.).

Adaville Carol	Wm. Cooke, Witta, *via* Maleny	7,689·75	395·7	Linwood Clinker	June
Laureldale Carrie	Wm. Cooke, Witta, *via* Maleny	7,079·8	385·156	Laureldale President	June
Laureldale Poppy (187 days)	W. A. K. Cooke, Witta	6,920·55	366·988	Laureldale Peaceboy	June
Laureldale Veronica	W. Cooke, Witta	10,386·2	514·878	Laureldale President	July
Laureldale Velvet	W. Cooke, Witta	9,361·25	466·761	Laureldale Prairie Prince	July
Laureldale Clare	W. A. K. Cooke, Witta	6,734·95	403·021	Minna Murra Topsy's Sequel	August
Fernhill Golden Laurel	D. C. Johnston, Logan Village	7,708·8	350·089	Cooroora View Pilgrim	September

PRODUCTION RECORDING—*continued.*

Animal.	Owner.	Milk Production.	Butter Fat.	Sire.	Month Compiled.
		Lb.	Lb.		
	GUERNSEY—*continued.*				
	SENIOR, 4 YEARS (STANDARD 330 LB.).				
Adaville Sweetness	Wm. Cooke, Witta	6,269·8	354·186	Laureldale Pluto	July
	JUNIOR, 4 YEARS (STANDARD 310 LB.)				
Laureldale Liddy (222 days)	W. Cooke, Witta	9,473·15	462·201	Minna Murra Topsy's Sequel 2nd	June
	JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Tattenbar Fay	W. A. K. Cooke, Witta	8,029·9	399·96	Laureldale Trump	August
	SENIOR, 2 YEARS (STANDARD 250 LB.).				
Adaville Charm (251 days)	D. C. Johnston, Logan Village	5,928·15	285·133	Laureldale Pluto	July
Adavale Sweetty	G. Miller, Chambers Flat	5,889·45	271·742	Linwood Guess	July
	JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Laureldale Pleasant	W. A. K. Cooke, Witta	5,068·43	280·04	Minna Murra Topsy's Sequel	August
	AYRSHIRE.				
	JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Leafmore Miss Bell 2nd	J. P. Ruhle, Motley, *via* Oakey	6,399·8	279·589	Leafmore Jerrard	July

WHY CREAM TESTS VARY.

The following equations should be substituted for those given on pages 153 and 154 of the September issue:—

Diagram 2, Low Speed—Cream Test = 18%.

Diagram 3, Small Inflow—Cream Test = $\frac{11{\cdot}2}{20} \times 100 = 56\%$.

The Tail Strip Operation.

G. R. MOULE, Officer in Charge, Sheep and Wool Branch.

THE widespread application of the Mules Operation, which is a very effective protection against crutch strike of sheep, has focussed attention on strike originating on other parts of the sheep's breech, such as the tail.

It has been clearly shown that the length at which the tail is cut has an important bearing on the subsequent predisposition of the sheep to strike originating in the crutch as well as on the tail. For this reason it has been suggested that the lamb's tail should be cut at about the level of the tip of the vulva.

Other factors, however, may influence the likelihood of strike originating on the tail. These include the shape of the tail, the length of the wool on the tail and the way in which the tail has been cut. It is generally accepted that in tailing lambs it is essential to turn the bare skin from the undersurface of the tail back over the severed stump. This obviates the danger resulting from wool, which may grow on the very tip of the tail, becoming wet with urine and attractive to flies.

Similarly it has been found that it is possible, by performing a simple operation referred to as tail stripping, to draw the bare skin from the undersurface of the tail around its sides. This is done by removing a strip of the wool-bearing skin from the back of the tail. When healing is completed the sheep has a narrow fringe of wool down the centre line of the back of the tail and the risk of soiling of the wool growing on this appendage is thereby removed.

Field experience has shown that this operation will increase the protection against strike originating on the tail, irrespective of its length. Accordingly its use is recommended where woolgrowers feel that it is inadvisable to cut the lamb's tail long enough to be level with the tip of the vulva and/or where there is a high incidence of tail strike.

Performing the Operation.

The tail strip operation can be performed before the tails are cut at marking time, or in conjunction with the Mules Operation at or about weaning time, when it is particularly easy to perform if the sheep are fat. The main advantages of doing the operation at marking time are (i.) it may be easier to hold the tail; and (ii.) the cuts can be carried right down past the level at which the tail is to be cut.

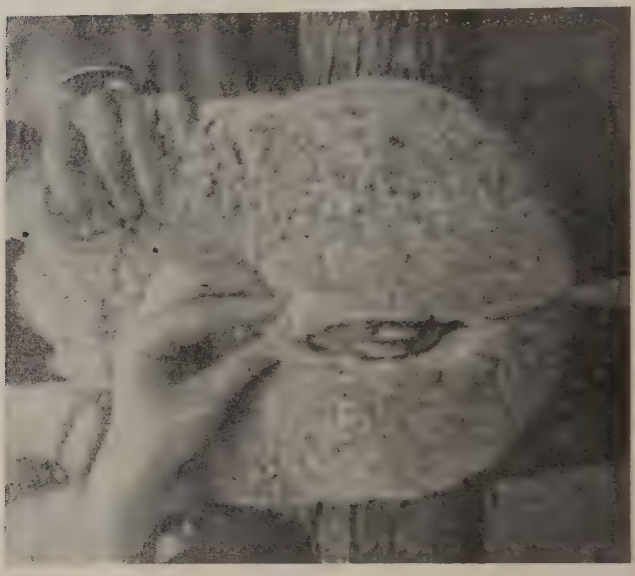


Plate 71.

Showing the Fringes of Wool left on the Tail.

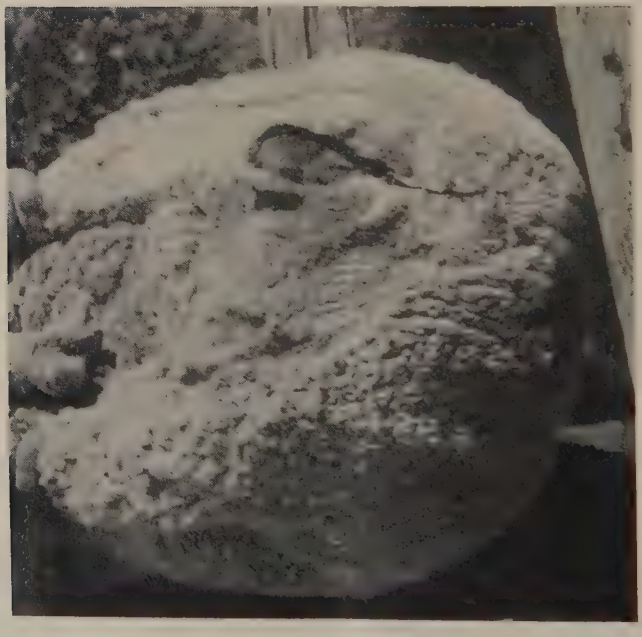


Plate 70.

The Tail Strip Operation Performed on a Weaner.

If the operation is performed on older sheep, such as weaners, it is essential to carry the cut down to the very end of the tail so that the wool-growing skin is removed right to the tip, as is shown in Plate 70.

The operation is performed with a sharp pair of 5-inch dagging shears similar to those used for the Mules Operation. The "reverse" grip—that is, back of the hand to the sheep—is used and the cut should commence well above the base of the tail with a sharp "V." This is most easily achieved by picking up the skin with the shears at the commencement of the cut. In treating lambs the cuts should go well down past the level at which the tail is to be severed (Plate 71).

Plate 72.

SHOWING THE LENGTH OF THE CUT ON A LAMB.

As the cut is extended down the back of the tail its width is increased to leave a fringe of wool about ¼-inch–⅜-inch on each side (see Plate 72).

If the operation is being performed on weaners it is essential to do it at a time when the wool is short, such as immediately after shearing or crutching.

The usual precautions which are observed in undertaking the Mules Operation, such as keeping the instruments clean and avoiding carrying out the work when bush flies and/or blowflies are numerous, obviously apply.

ANIMAL HEALTH

Brucellosis (Contagious Abortion) in Cattle.

A. L. CLAY, Divisional Veterinary Officer.

DEFINITION AND CAUSE.

THE term "brucellosis" confuses many people. To add to the confusion many American writers refer to contagious abortion of cattle as "Bang's disease," a name derived from that of the man who discovered the cause of the disease in 1896. It is well, therefore, to know the derivation of the term brucellosis and why it is preferred to the older name, contagious abortion.

The term brucellosis comes from the name given to a group of micro-organisms of a rather special type, which cause disease in man, cattle, pigs and horses. The first man to discover one of these organisms was David Bruce. He made the discovery in 1887 when investigating a disease of human beings known as Malta or Mediterranean fever, and called the organism *Micrococcus melitensis*. Some 30 years later (in 1918) the relationship of this disease to contagious abortion of cattle was revealed. Since that time the organism causing Malta fever has been named *Brucella melitensis* in honour of the discoverer, and the organism which causes contagious abortion of cattle, previously known as *Bacillus abortus*, has been renamed *Brucella abortus*.

Brucellosis simply means "disease due to *Brucella* organisms." It is a specific disease which can occur only in the presence of these organisms. The term can be used to describe the disease whether it occurs in man, cattle, pigs, or horses, and when it is used no room is left for confusion because it can mean only one thing, that is, disease due to *Brucella* organisms. No other term has this advantage.

Additional reasons why the term brucellosis is to be preferred are as follows:—

(1) There is more than one kind of abortion in cattle which is of a contagious nature, so that when different people speak of "contagious abortion" they may be speaking of quite different diseases.

(2) Some cows affected with brucellosis do not abort at all; and many, though they abort once, carry subsequent calves to full time.

(3) There are other important consequences of brucellosis in cattle quite apart from abortion. Such are sterility, difficulty in rearing calves, and lowered production.

ECONOMIC IMPORTANCE.

Losses caused by brucellosis in cattle are often very considerable, so much so that individual farmers have sometimes been virtually forced to give up dairying because of the ravages of the disease. No reliable estimate is available of the loss in the aggregate to the dairy industry in Queensland or the other Australian States, but there can be no doubt that it is huge.

The losses in affected herds are largely the result of lowered milk production. It is universally accepted that production in an infected herd compares unfavourably with that in a "free" herd, all other things being equal. The lower milk production in infected herds is due to calvings taking place before full term, delay or even complete failure of cows to prove in calf, and the prolonged ill-health which is sometimes the aftermath of an abortion, especially if accompanied by retention of the afterbirth.

A very large number of cows is believed to be disposed of each year as "tinners" because of sterility consequent upon brucellosis.

The serious position created in stud herds by the birth of dead calves or of weak calves which are difficult to rear is obvious.

Finally, it is necessary to note that the presence of brucellosis may lead to quarantine restrictions, direct or indirect, on farms, districts, or even whole States. No cattle can be imported into Australia unless they are free from brucellosis. In Queensland, because of the prevalence of the disease, quarantine is imposed only in exceptional circumstances.

DISTRIBUTION AND INCIDENCE.

Brucellosis is world wide in its distribution. In Queensland it occurs in all the recognized dairying districts and for the most part must be considered as prevalent, perhaps especially so on the Darling Downs.

The percentage of infected animals found in herds in which the disease occurs ranges up to 60 and even 80, excluding calves.

Though a figure cannot be stated with anything like certainty, it is probable that upwards of 10 per cent. of all dairy cows in a district like the Darling Downs are at any one time affected with brucellosis.

The disease occurs in beef cattle but is not of comparable importance to the disease in dairy cattle. There are exceptions, especially in stud beef herds, where the degree of contact between the animals approaches more closely that found in dairy herds.

HOW COWS BECOME INFECTED.

For the most part brucellosis is brought into a herd with purchased cattle. Buying replacement cattle at a saleyard is attended with the risk of purchasing infected animals; it should be avoided if at all possible. There is also some risk when making purchases at "clearing sales" as it may perhaps be that the "clearing out" process is in some measure the consequence of the ravages of brucellosis.

Straying cattle may introduce the disease. Sending cattle to other farms (as for service) or taking them to Shows and then returning to the home farm may introduce the disease. Dogs, foxes, and perhaps crows may act as mechanical conveyors of infective material.

Drainage from adjacent infected farms may be responsible for introducing infection.

Brucella microbes are frequently present in the milk of affected cows. This infection may occasionally be transmitted on the hands of milkers, especially to cows with abrasions on the teats.

Experimentally, cows have been infected through the eye and the skin, but these are not considered common ways of infection under natural conditions.

There can be no question, however, that introducing and maintaining infected animals in a herd is by far the most important source of infection.

Pasture Contamination.

Whether they abort or carry their calves to full term, infected cows discharge from the breeding passage, for some weeks, large numbers of micro-organisms, which contaminate the hindquarters, pasture, water supplies, &c. Since most cows are infected by way of the mouth, contaminated pasture represents the most common source of infection.

The droppings from calves fed on infected milk may contaminate pastures, the microbes passing right through the calves' digestive tracts without being destroyed.

The survival of *Brucella* microbes on pasture is obviously a matter of great importance. Survival is longer in winter than in summer, and at any time of the year is longer in a situation which is protected from the direct rays of the sun.

The longest survival time noted under experimental conditions in Australia has been between 90 and 100 days. The survival time was consistently longer for microbes in the afterbirth itself as compared with microbes in discharges.

Pastures are probably quite safe three months after the removal of infected stock in summer and four months in winter.

Infection from the Bull.

The part played by the bull in infecting cows has been the subject of much misunderstanding. It was originally thought that service by infected bulls was a common source of infection. Later investigations suggested very strongly that infected bulls did not transmit the disease in the act of service except perhaps in rare instances. Quite recently, however, Danish veterinarians have shown that at any rate some bulls can transmit the disease with some degree of regularity during service, more especially when their semen is used for artificial insemination.

Though many infected bulls fail to transmit brucellosis by service it has now to be recognized that some may do so and the use of such bulls may cause rapid spread of infection in a herd.

Infection from Other Animals.

Brucellosis of pigs requires some consideration in relation to mode of infection of cattle. The causal microbe in swine is known as *Brucella suis,* and though similar to *Brucella abortus* is not quite the same thing. Cattle are susceptible to *Brucella suis* but infection is not common.

Fistulous withers in horses is sometimes due to *Brucella abortus*, or at all events the latter is present in the lesion. Horses with fistulous withers, especially if the lesion is discharging, are a potential danger to cattle.

SUSCEPTIBILITY OF DIFFERENT CLASSES OF CATTLE.

Some cows are much more susceptible to infection than others. In herds which have been blood-tested annually without removing reactors it has been noted that some animals remain negative to the test year after year despite the presence of many infected animals in the herd. These negative animals have certainly been exposed to infection on numerous occasions but the infective agent does not become established in the cow. Such cows have a natural resistance to brucellosis. They constitute a varying percentage of the cows in different herds—usually 20 to 30 per cent. but sometimes considerably less.

Calves are rather a special case. Nearly all calves have a high resistance to infection, at all events until six months old. This is so whether the infection is natural or artificial, for example, by inoculation with living vaccines. From six months onwards the resistance decreases but is often evident even at 12 months of age. Resistance in calves is considered by some authorities to be connected with the lack of development of the sexual organs. Once these attain full development—that is, when the calf becomes capable of breeding—then susceptibility to infection increases very markedly.

The in-calf cow is more susceptible to infection, or at all events to the ill-effects of infection, than the not-in-calf cow. Abortion is much more likely to follow if infection occurs during pregnancy, except that if infection occurs after the seventh month there may not always be sufficient time for the *Brucella* microbes to cause enough damage in the uterus to bring on an abortion. Infection taking place while a cow is "empty," or during the very early stages of pregnancy, is quite often followed by an apparently normal calving.

It will be seen that infection with *Brucella* microbes need not necessarily result in the calf being aborted.

SYMPTOMS.

The most obvious symptom is the failure of cows to carry their calves to full term, the calf being aborted usually at about the fifth month of pregnancy, though sometimes earlier. However, calves may be carried to full or nearly full term and be born dead, or if born alive be underweight. Further, in these cases there is often retention of the placenta (that is, failure of the cows to get rid of the afterbirth).

Sterility is a matter of very real concern in the great majority of heavily infected herds and is due to the abnormal uterus (womb) which prevents conception. Brucellosis would be less serious than it is if, following abortion, the uterus always returned to its normal healthy state and so allowed of another pregnancy being got under way. Unfortunately, such is often not the case, cows being left with a chronic inflammation of the womb. The condition is very difficult to treat because the organ is so inaccessible.

Calves born of affected dams are prone to scours and pneumonia.

A less frequent indication of the disease is the presence of swellings on various parts of the body. Sometimes these swellings are associated with joints, the knee joint being the one most commonly affected. On the other hand, the swellings may have no association with a joint: in these cases they occur commonly on the sides of the neck, on the withers, in the flank or over the hip. The swellings in the neck region may be very large and contain a gallon or more of fluid.

In the bull there may be swelling of one (usually) or both (sometimes) testicles, but such is not necessarily the case.

None of the symptoms described can be regarded as enabling certain diagnosis of brucellosis. This can be done only after use has been made of the "blood test."

As has already been noted, once cows abort as the result of brucellosis they will in most cases carry subsequent calves to full term, always provided they remain capable of breeding. This is of great importance in assessing the results obtained from the administration of "cures" or "remedies."

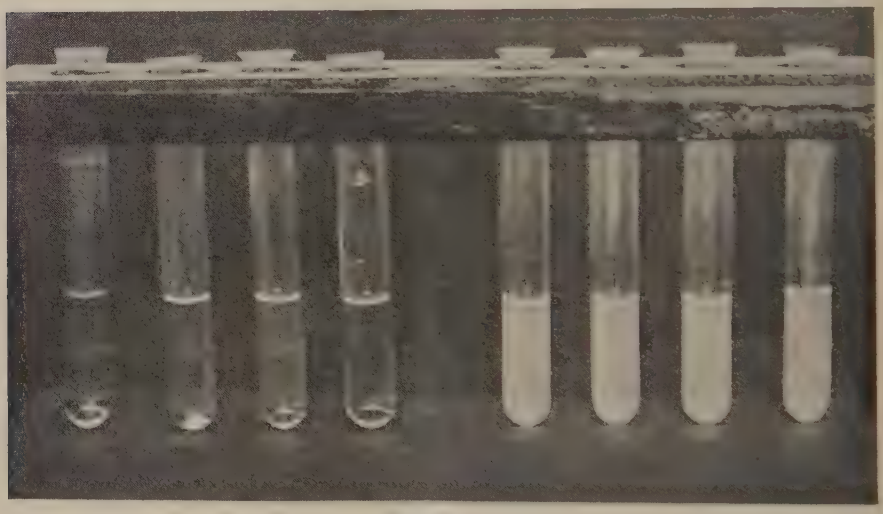


Plate 73.

Agglutination Tests.—Left, positive tests; right, negative tests.

POST-MORTEM CHANGES.

The disease does not cause death of the dam, but if the animal is killed and examined the only sign found is an inflammation of the uterus. Even this is not constant.

The afterbirth which is shed following the delivery of a dead calf usually (but not always) shows some changes from the normal. The cotyledons are a dirty-yellow colour and gelatinous in consistency. The membranes as a whole may be infiltrated with a yellow gelatinous material. Most suggestive of all is the presence of areas in the membranes which can be described as leathery in texture.

DIAGNOSIS BY BLOOD TESTING.

One can suspect the presence of brucellosis in a herd but there is only one way of making certain, and that is to submit blood samples from suspected cattle to a laboratory for test. The test is correctly referred to as an agglutination test, but is commonly spoken of as a "blood test." The test is carried out on the serum—that is, the clear yellowish fluid which separates out from blood after it has clotted. The serum is mixed with a suspension of *Brucella* microbes in a series of small glass tubes. The mixture which results is cloudy in appearance. The tubes are then placed in an incubator for 24–48 hours, after which time the test is read (Plate 73).

In a positive test the mixture in the tube becomes quite clear and the microbes which were responsible for the cloudy appearance settle on the bottom of the tube as a distinct deposit or sediment. In a negative test the cloudy appearance remains and no deposit forms at the bottom of the tube.

Plate 74.

Collecting a Blood Sample.—Note tourniquet or bleeding strap applied so as to cause distension of the jugular vein. The needle is inserted into the vein with a quick thrust; then, the sample having been collected, the tourniquet is loosened *before* the needle is withdrawn from the vein.

The test works by reason of the presence of certain "antibody" substances in the blood stream of infected animals. When these substances in the blood serum come into contact with the *Brucella* microbes in the tube, they cause them to agglutinate (hence the name agglutination test) or clump together. Having done so they are no longer capable of remaining suspended in the liquid, and sink to the bottom of the tube, leaving a clear fluid above.

The test is reliable to an extraordinarily high degree, but it is not infallible. A small percentage of infected cows will not react at the time of the act of abortion or of calving, whichever it may be. Some weeks later they will give a positive reaction.

Another disadvantage is the fact that the development of antibodies in the blood (consequent upon infection) is occasionally a very slow process. Before antibodies appear in such animals an eradication programme may be believed to have been completed and testing suspended temporarily. Such an animal may thus be undetected until it aborts and starts a fresh cycle of infection.

Taking Samples for Testing.

Blood samples for submission to test may be obtained from the ear, the tail or the jugular vein. The jugular vein is by far the most satisfactory (see Plate 74). A fairly stout hypodermic needle about 3 inches long is required and the use of a device known as a King bleeder to hold both the needle and the bottle into which the blood sample is drawn greatly facilitates the procedure.

The cow's head must be secured firmly to a rail or post. A strap or cord is then looped round the animal's neck and pulled taut. This results in the jugular vein becoming prominent, whereupon the needle is inserted with a quick thrust and the sample collected. The strap is then loosened and the needle withdrawn from the vein.

A sword-type bail is very useful for bleeding cattle and can be installed at the exit end of a crush.

GENERAL FARM PRECAUTIONS.

In the absence of an attempt to eradicate the disease altogether, there are certain general precautions which should be taken.

(1) Isolate all cows which abort or have premature calves, such isolation to continue until all traces of discharge have disappeared. During the isolation period (especially the early part) syringe out the cow with a reliable antiseptic solution to minimize the output of live *Brucella* microbes. "Dettol" and "Lysol" (1 fluid oz. to 1 gallon of lukewarm water) are examples of suitable fluids to use. About one quart should suffice for each cow unless the amount of discharge present is exceptionally large.

The person carrying out this work should wear gum boots and either remove them just prior to leaving the isolation paddock or else disinfect them thoroughly.

(2) Do not use a known infected bull if it can be avoided. Do not put cows mentioned in (1) to a non-infected bull for at least six weeks after they have aborted or (in later years) calved.

(3) Locate the foetus and the afterbirth (if not retained) and burn them and fire the grass in the immediate vicinity. If this is too much of a fire risk, then disinfect as efficiently as possible.

(4) Keep the tail and buttocks of all cows free from matted discharge. This material may be teeming with *Brucella* microbes.

(5) Watch cows carefully for signs of impending abortion with a view to getting them into isolation before the event takes place.

(6) Rear all herd replacements on the property; but if purchases must be made, then buy only from herds which are beyond reproach, or if your herd is already infected buy animals which have been vaccinated as calves.

(7) Unless special circumstances exist it is best to dispose of infected cattle in the late spring or early summer, for the reason that residual infection on pasture will die out quicker at that time of the year.

(8) Send to slaughter cows known to be infected and which fail to prove in calf after a reasonable period.

In the absence of precautions as outlined, a certain "balance" eventually comes about in an infected herd and a farmer perhaps comes to think that brucellosis is after all not a matter of any great account. Now, though it is well recognized that brucellosis is self-limiting, the disease leaves many cows sterile. The average number of services by the bull per live calf may rise as high as five, the calf crop itself may come down to 50 per cent. of the cows annually, production comes down and wastage through having to cull barren cows is heavy. In such herds the percentage of heifers which abort is often very high indeed; moreover, as the abortion takes place while the animals are still growing, the ill-effects are accentuated.

TEST-AND-SLAUGHTER METHOD OF CONTROL.

Test and slaughter is a method which has been an important means of controlling brucellosis for many years. Until comparatively recent times it was really the only worth-while method available.

The blood test enables the animals in a herd (as at the date of test) to be catalogued as infected, possibly infected, and not infected. They are referred to as positive, suspicious, and negative, respectively. Obviously, if all the infected animals—and to be on the safe side, the possibly infected ones also—are removed the remaining herd is composed exclusively of non-infected animals. However, the infection present on the pastures grazed by the infected cattle will remain for about three months and during that time some of the non-infected animals may become infected through grazing on those pastures. It must also be recognized that there may still be animals in the herd which though actually infected have not arrived at the stage where they react to the blood test. To counter this situation, what remains of the herd is retested at 30-day intervals until a "clean" test is obtained. After the second and each subsequent test the positive reactors are eliminated, but suspicious reactors are often held until the next test and, as it were, given another chance.

It is necessary to get two "clean" tests at an interval of not less than 90 days before a herd can be accepted as free from the disease. The number of tests which have to be applied before this requirement is met varies greatly and there is no way of forecasting it. The number of cattle which have to be liquidated also varies greatly; it is again difficult to forecast. The procedure meets with earlier success on some farms than others, but the reasons are not always apparent.

The cost of this method may be considerable and there are many farms on which it cannot be justified in the light of present-day knowledge. It does have attractive features if a man has two farms, on one of which he can run all the reactors (infected cattle) and on the other the "clean" (non-infected) cattle.

Having "freed" a herd from brucellosis it has often happened that the disease is re-introduced at a later date despite all practicable

precautions having been taken. This is a most serious drawback to the method. If in the process of obtaining a "free" herd a "resistant" herd were acquired, then the method would be much more attractive. It has become usual in Queensland to advise against attempts at eradication of brucellosis if the percentage of infected cattle detected at the first test of a herd exceeds 15. Nevertheless, on some farms the test-and-slaughter method of control has been used to the complete satisfaction of all concerned even when the initial infection in the herd has been comparatively high.

It is much more attractive when testing is being carried out on an area basis—that is to say, testing is carried out on a group of adjacent farms at one and the same time. This largely eliminates the risk of re-infection.

In deciding on whether to control brucellosis by test and slaughter the following considerations must be kept in mind:—

(1) Danger of re-infection after herd has been "freed" from the disease.

(2) Economic value of the animals in the herd.

(3) Percentage of animals found infected on the occasion of the first test of the herd.

(4) Is the herd self-contained?

In general it can be stated that stud herds with a low initial infection are the most suitable herds in which to use the test-and-slaughter method. Grade herds which are not self-contained present difficulties which are not easy to overcome.

CONTROL BY VACCINATION.

Control by vaccination has been attempted ever since the bacterial nature of brucellosis was first discovered, 50 years ago. It was early evident that dead vaccines had no immunizing effect against the disease and that living vaccines must be used. It was also evident that the virulence (power to produce disease) of the microbes in the vaccine must not be reduced in any way otherwise the immunizing power would be correspondingly reduced. The use of such fully virulent live vaccines had serious disadvantages. Abortions were prevented but the disease itself was perpetuated; the infection became established in the vaccinated animals and was shed in the afterbirth and milk, thus exposing other animals as well as man to the risk of infection.

In Australia the use of fully virulent live vaccines has at all times been prohibited.

Strain 19.

In 1925 Buck, working in the United States of America on an attempt to improve vaccination against brucellosis in cattle, came across a strain of *Brucella abortus* (since known as Strain 19) which was of considerably less virulence than is usual with this organism. Later Buck tested the immunizing power of this strain when used as a vaccine and concluded that, notwithstanding its lower virulence, it was capable of producing a serviceable immunity. Buck's view has been generally accepted and the use of Strain 19 vaccine is increasing in most parts of the world.

Advantages and Disadvantages.

Strain 19 has several advantages over the more virulent strains of *Brucella abortus* which were earlier in use as vaccines. It does not become established in the vaccinated animal other than in exceptional circumstances; and it never does when its use is confined to calves. It does not spread disease from vaccinated to unvaccinated animals. It does not become localized in the udder and hence is not shed in the milk.

Plate 75.

Inoculation with Strain 19 Vaccine.—The injection is made low down on the side of the neck almost over the brisket. Note the loose skin which makes the injection easier and safer for the operator and allows of ample room for local swelling caused by the vaccine without detriment to the calf.

When properly applied, Strain 19, apart from some local swelling produced at the site of inoculation, is not harmful to the animal in any way whatsoever.

The main disadvantage of Strain 19 is that the immunity conferred by it is not absolute. If the degree of exposure to infection is high enough, then the vaccinated animal will in many instances contract brucellosis. There is also a difference of opinion as to how long the immunity lasts. It is at its highest a few weeks after vaccination is carried out and then falls very gradually until, at the end of a period which remains to be definitely determined, it probably becomes of little or no value. But this is after all no different from the position in respect of many other vaccines. The important thing is whether Strain 19 vaccine helps to bring brucellosis under control. There can no longer be any doubt on this point; its use is certain to effect improvement when intelligently applied. Abortions are not eliminated altogether but they are reduced to a point where they cease to be of any great consequence. Accompanying this is a decided improvement in the fertility level in the herd, easier rearing of calves, and increased production generally.

There can be no doubt that ultimately another type of vaccine will become available which can be used as a reinforcing inoculation after the first or second calf has come along. The effect of this will be of course to bolster up the waning immunity conferred by the original injection of Strain 19. Strain 19 itself cannot be used for the second inoculation, since it is not considered satisfactory for general use in adult cattle.

There is no truth in the suggestion or rumour that Strain 19 leaves many heifers unable to breed. The experimental evidence in this regard is very clear; no difference can be discerned between the breeding capacity of vaccinated and that of unvaccinated heifers.

Precautions to be Observed.

In Queensland the use of Strain 19 vaccine is subject to permit, firstly because it consists of living organisms to some extent dangerous to man, secondly because it must be used under special conditions. For these reasons its use is confined to approved persons, that is, veterinary surgeons and certain officers of the Department of Agriculture and Stock.

All who carry out vaccinations are required to undertake to observe the following conditions:—

(1) No male cattle to be vaccinated.

(2) No pregnant animal, irrespective of age, to be vaccinated.

(3) No animal over 12 months to be vaccinated.

(4) As far as possible vaccination to be confined to calves between the ages of 4–8 months.

(5) Records of all calves vaccinated to be kept.

Calves under four months of age are not vaccinated for the reason that many of them fail to "take" and little or no immunity results.

No bull calves are accepted, for the reason that there is little or no reliable information as yet on the results of using Strain 19 vaccine on male animals. There is reported to be a possibility of Strain 19 localizing in the testicles of male animals and setting up a permanent infection.

Vaccination of adult cattle is not permitted in Queensland for the following reasons:—

(1) Permanent infections may be set up.

(2) Long-lasting positive reactions to the "blood test" are set up in nearly all cases.

(3) The local reaction to vaccination is very often severe and a permanent lump may remain at the site of inoculation.

(4) Milk flow is often seriously depressed for 2–3 weeks following inoculation with the vaccine.

(5) As vaccination of adult cows (even if practised) must be carried out when cows are "empty," a series of visits must be made to each farm before all the cows can be inoculated. The man-power problem involved here is considerable, and in combination with the other disadvantages has brought vaccination of adult cows into disfavour.

Vaccine Supply and Costs.

The vaccine is put up in bottles containing 100 c.c., or sufficient for 20 calves, the dose being 5 c.c. As the vaccine is comparatively costly, as well as being in short supply, waste cannot be tolerated. It is essential that groups of farmers get together to ensure that as near as possible to 20 or multiples of 20 calves are available in the one locality for inoculation on any one day.

The charges made for inoculation by private veterinary surgeons will naturally have some relation to the number of calves and the distance travelled. The Department of Agriculture and Stock charges 2s. per calf as a flat rate, but it is only reasonable to expect that as the distance travelled increases so should the number of calves.

Vaccination is especially suited to those herds which are already heavily infected. There is, however, a case for vaccination whenever the danger of infection or of re-infection exists.

When vaccination is used to control brucellosis there is not the same necessity or desirability for a herd to be self-contained as is the case when "test and slaughter" is the method used. It is quite untrue that vaccination gives worth-while results only in self-contained herds.

Vaccination and Blood Testing.

Vaccination and the use of the blood test may be combined to advantage. Vaccinations must be restricted to heifer calves not older than eight months. This is for the reason that vaccination with Strain 19 is followed by the development in the blood of those antibody substances which are responsible for a positive reaction to the "blood test." This is to be expected and in fact is looked for as evidence that the vaccine has "taken." This positive reaction in vaccinated calves has quite a different significance from that given by animals which have contracted the natural disease. In the former case it indicates only a temporary infection with no danger of organisms being shed by the animal; in the latter case it indicates a permanent infection with every prospect of organisms being shed by the animal.

The positive reaction given by vaccinated calves gradually fades; but the older the calf at the time of vaccination, the longer the reaction lasts. Once the vaccinated calf reaches the age when a natural infection becomes a possibility, confusion and doubt as to the significance of the positive reaction become inescapable. The reason for this is that the "blood test" as at present constituted does not enable us to distinguish between a reaction due to vaccination and one due to natural infection. If careful records are kept of the animals which are vaccinated as calves there is less room for doubt, but it cannot be removed altogether.

It is for the reasons stated that, when combining vaccination with the use of the "blood test," the age of the calves which are vaccinated must be kept down rather lower than would otherwise be the case. Even so, in order to retain a "negative" herd it may still be necessary to dispose of a small percentage of calves vaccinated, because they fail to return to a "negative" state.

The main advantage of combining vaccination with the "blood test" is that an owner can look forward to having a "resistant" as well as a "free" herd and thus help materially to eliminate the possibility of re-infection and consequent breakdown.

In the early stages of an eradication programme the combination also enables the economic impact to be spread by disposing of reactors over a longer period. There is not the same pressing urgency about disposing of all infected cattle, as the young stock are protected (by vaccination) before they reach a susceptible age. This is obviously likely to be especially attractive to owners of stud herds in which a medium to high initial incidence of infection exists. Eradication can come four or five years later when the herd is composed largely of animals which have been vaccinated as calves.

Vaccination as an adjunct to "test and slaughter" should be seriously considered whenever the risk of re-infection of a "free" herd can be regarded as real. The consequences of this latter can be extremely serious.

Time to Start Vaccination.

Calfhood vaccination with Strain 19 is a long-term project, no matter what the circumstances in which it is used. It takes at least two years to obtain useful results in even small measure, and 4–6 years must elapse before its full benefits can be obtained. The aim is to "turn the herd over." It is very necessary to realize this and not postpone vaccination until the disease strikes. The time to start vaccinating is now.

USE OF DRUGS, &c.

The cure of brucellosis by the injection of various chemical substances has in the past been the subject of many claims by different people. A very popular "cure" was a weak solution of carbolic acid administered as a hypodermic injection. This in common with many others has been shown to be useless.

With the advent of the sulpha drugs high hopes were held, but these too proved useless. Even penicillin has been found wanting.

A more recent product known as streptomycin holds out some promise, but it is not yet in the realm of practical farm use, being scarce and very expensive.

Douching or syringing the vagina with antiseptic fluids helps to reduce the amount of infective material dispersed by affected animals, but is not a cure of the disease itself.

RELATION OF BRUCELLOSIS TO VAGINITIS AND MASTITIS.

All three conditions are often seen in a herd at the same time but they are quite unrelated. Vaginitis is often seen in herds which have been proved (by blood test) to be free from brucellosis. Treatment of vaginitis will have no influence on brucellosis should the latter be present in the animal.

With regard to mastitis, it is necessary to note that *Brucella abortus* is found in the udder of infected cows during the time they are not in calf. Its presence does not, however, cause any inflammation of the udder and is not considered to have any bearing on whether the cow will or will not become affected with mastitis.

RELATION TO HUMAN DISEASES.

Both *Brucella abortus* and *Br. suis* can cause undulant fever in man.

The disease due to *Brucella abortus* is very similar to Malta fever (due to *Brucella melitensis*). It is usually contracted from close contact with cattle and hence occurs chiefly in farmers, veterinarians, cattle buyers and other people closely associated with cattle. There is also the possibility of infection occurring through drinking unpasteurized milk from infected herds.

The disease in humans may be serious, especially as treatment is reported to be unsatisfactory.

Cases of undulant fever have not been common in Australia up to the present time, but there can be no certainty that this state of affairs will continue.

It is clear that brucellosis in cattle has features which are of interest to the community as a whole as well as to the owner of the affected cattle.

Animal Health Station Services.

During the year ended 30th June last, the Department's Animal Health Stations at Yeerongpilly (near Brisbane) and Oonoonba (near Townsville) received nearly 18,000 specimens for examination. Of these, about 12,000 were blood samples for examination for brucellosis (contagious abortion) of cattle and 1,700 for brucellosis of pigs. The other samples were of milks, dipping fluids, animal tissues, &c., submitted for diagnostic purposes.

More than 300,000 doses of pleuro-pneumonia vaccine and 274,000 doses of infectious labial dermatitis (scabby mouth) virus were supplied to stockowners. Graziers purchased 146 steers for use as reservoirs for tick fever vaccine, and 213 stud animals going into ticky country were held at the stations for vaccination purposes.

At both stations, experimental work on newer types of insecticides for use in cattle dips against the cattle tick was continued. The insecticides used included DDT, benzene hexachloride (B.H.C.), and chlordane.

FARMERS' WOOL SCHEME DISCONTINUED.

An advertisement concerning the Department's Farmers' Wool Scheme which had appeared in an earlier issue of the Journal was re-inserted by error in the September issue.

Will farmers please note that the Department is not now receiving wool for classing? The scheme was discontinued from 31st August because a similar service is now being operated by commercial firms.

Royal Show Champions.

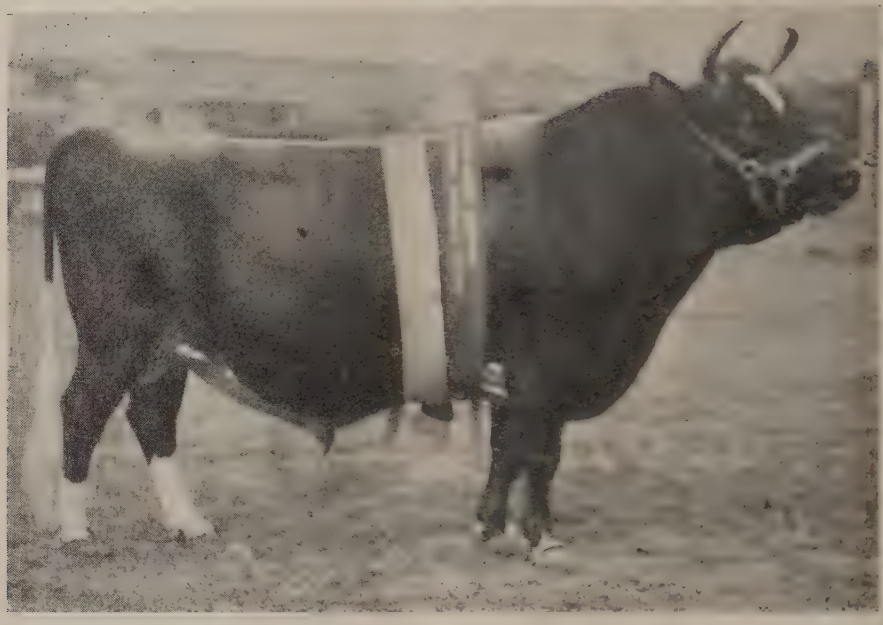


Plate 76.
Champion Jersey Bull.—Navua Victorious Samaritan.

Plate 77.
Champion Guernsey Cow.—Fernhill Bouquet.

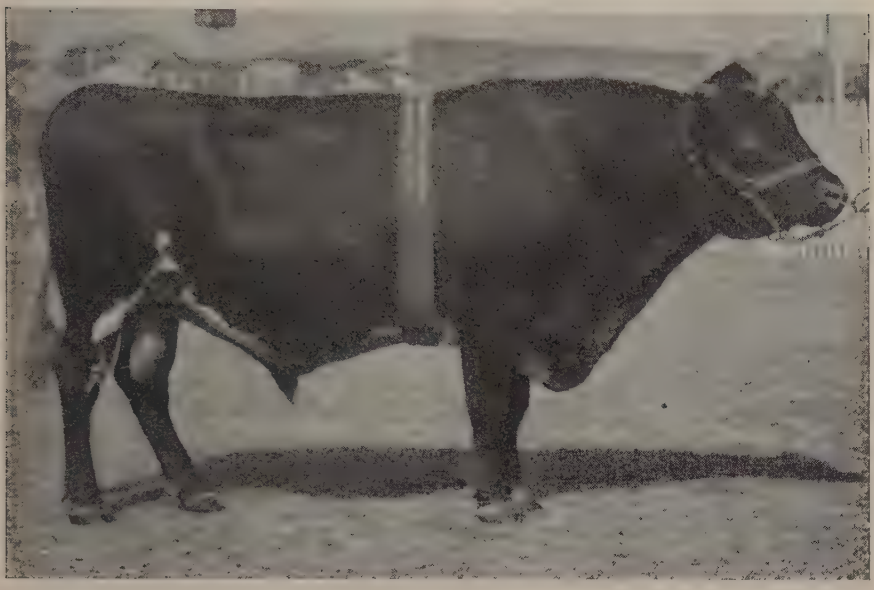


Plate 78.
Champion A.I.S. Bull.—Sunny View Kitchener.

Plate 79.
Champion A.I.S. Cow.—Sunny View Gem 8th.

Plate 80.
Champion Shorthorn Bull.—Tarvas Mandarin.

Plate 81.
Champion Shorthorn Cow.—Turanville Shy Dawn.

MARKETING

Production Trends—September.

Pastures on the Darling Downs and in the Maranoa and Warrego districts were in good condition, but in the Central District and on the Central Highlands drought conditions extended. Dry conditions prevailed at Hughenden, whilst at Cunnamulla the position deteriorated. The outlook in most pastoral areas will remain poor unless early storm rains are experienced.

The rains on the Darling Downs and in the Maranoa district were of particular value to grain and fodder crops, and land is in better condition for preparation prior to the planting of summer crops. The area planted to wheat for grain is now estimated to be at least 550,000 acres, and it is expected that a record harvest of 12,000,000 bushels will result.

In the sugar growing areas weather conditions have been dry and, although favourable for uninterrupted harvesting, have adversely affected young plant cane. In all areas estimates of cane for crushing are showing increases over earlier figures.

Dairy production has been well maintained for this time of the year, stock are in good condition, and water supplies are adequate. The estimate of butter production for September is 7,280,000 lb. If this estimate is realised, it will be the highest butter production for the month of September since 1939.

Brisbane Wholesale Markets.

During the month of September there was a general easing of prices of greens with values for cabbages almost at glut levels at the end of the month. Prices for all other vegetables remained at very high levels. Prices for the decreased supplies of tomatoes offered, and particularly for northern tomatoes, reached what must have been almost record high levels.

Bananas were in moderate supply and prices were fairly high. Quantities of pineapples were falling off and values remained firm, but increased supplies of papaws, particularly from local districts, resulted in a general reduction of price.

Oranges were plentiful. Choice fruit sold well at payable prices, but other grades were slow to clear at from 6s. per bushel case.

Strawberry supplies were diminishing during the month and quality was rather poor.

The Egg Marketing Board.

The month of September saw the completion of a quarter of a century of organised marketing in the egg industry. The Egg Marketing Board, which was constituted on 19th June, 1923, and commenced to function on 1st September, 1923, was the second Board to be constituted under the Primary Producers' Organisation and Marketing Acts. As a matter of interest the original members of the Board were—Messrs. H. M. Stevens (Chairman), J. R. Wilson, R. A. Chapman, N. H. Campbell and J. Hutton (representing the egg producers), and H. H. Bentley (representing the Council of Agriculture).

Japanese Agriculture.

For the next five to ten years Japan will have to import from 15 to 20 per cent. of its food requirements in order to feed its population of 75 million, an average caloric intake of 2,100 to 2,200 calories per person per day. This is revealed by an article appearing in "Foreign Agriculture" for August, 1948.

Agriculture is the most important single industry in Japan, because about 50 per cent. of the national industrial capital is invested in it, and because 47 per cent. of the population is engaged in it for a livelihood. The main crops are rice, barley, wheat, sweet potatoes, and potatoes. Rice dominates the entire agricultural

economy and in 1945 this crop occupied approximately 53 per cent. of the total cultivated area. Barley ranks second among the crop plants in Japan, and from a position of relative unimportance wheat in recent years has also become one of the major crops. About 75 per cent. of the wheat crop is milled into flour, the remainder being pearled and cooked with rice.

The facts gathered during the first year of military occupation of Japan have revealed relatively few defects in the Japanese Government programme for the "maximising" of indigenous food production. The average yields per unit area are already amongst the highest in the world, but production of the five principal field crops on which the food supply of the country is so heavily dependent will have to be increased if Japan is to become self-sufficient insofar as her food requirements are concerned.

CURRENT FEEDING VALUES FOR MONTH OF SEPTEMBER, 1948.

(Division of Animal Industry and Division of Marketing.)

Feed.	Starch Equivalent Value per 100 lb.	Digestible Crude Protein Value per 100 lb.	Average Wholesale Selling Price at Brisbane.	Cost per Starch Equivalent Unit.	Remarks.
				d.	
Starch Concentrates.					
Wheat	72	8	7s. 7d. bushel	2·11	Maize very scarce.
Wheat Meal	72	8	£14 13s. 4d. ton	2·44	
Maize	78	8	7s. 11½d. bushel	2·19	Light supplies auctioned after price control lifted realised 10s. 4d. to 10s. 8d. bushel. Sorghum supplies negligible. Only light supplies of bran and pollard.
Maize Meal	71	8	£16 10s. 0d. short ton	2·78	
Sorghum	71	7	Not available		
Sorghum Meal	71	7			
Barley	71	7			
Barley Meal	71	7			
Oats	62	8	5s. 11d. bushel	2·86	
Crushed Oats	62	8	6s. 1d. bushel	2·94	
Pollard	66	10	Not quoted	..	
Bran	56	10	£12 10s. 0d. short ton	2·68	
Molasses	50	..	47s. 6d. drum	2·59	
Protein Concentrates.					
Meatmeal	80	55	Not quoted		
Linseed Meal	72	25			
Peanut Meal	78	43			
Blood Meal	63	68			
Cottonseed Meal	67	33			
Meat and Bone Meal	68	46			
Roughages.					
Lucerne Hay and Chaff	35	15	Hay £8, Chaff £11 5s. 0d. ton	2·45–3·44	Market steady.
Oaten Hay	35	3	£6 ton	1·83	
Wheaten Hay	35	3	Not available	..	
Oaten Chaff	35	3	£9 10s. 0d. ton	2·90	
Wheaten Chaff	35	3	£7 5s. 0d. ton	2·21	Quality lower.
Mineral Supplements.					
Ground Calcium Carbonate (Limestone)			..	..	
Bone Meal			£11 10s. 0d. ton	..	In short supply.
Bone Flour			..	..	
Shell Grit			4s. 2d. bag	..	Scarce.

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

FORMING GOOD SLEEPING HABITS FOR BABY.

MANY mothers and fathers are worried because their babies or children do not sleep well, and lots of questions are asked as to the reason for this.

Parents would do well to remember that habits of sleep develop much in the same way as habits of eating. A tired baby learns that sleeping is pleasant, and if he is made comfortable beforehand by sufficient food, by making him dry, and adjusting his bedclothes to the temperature of the room he will go to sleep. Very soon he will develop the habit of sleeping at regular times.

Although good sleeping habits are so easy to establish in early infancy they will only be maintained if baby continues to get satisfaction from them.

If mother disturbs her baby's sleep by waking him up to show him off to her friends, if daddy arouses him for a game when he comes home from work, baby will soon decide that it is more exciting to stay awake, and then we have the complaint, "Baby won't go to bed until I do."

It is necessary, then, to allow baby to associate his bedtime with the pleasant feeling of food and warmth and the sleepiness which usually develops towards the end of his feeds.

Sleeping Conditions.

The conditions that make sleep refreshing for older people are also necessary for baby—namely, plenty of fresh air passing in a current through the room, no light shining in the eyes, quiet, a clean body and clean comfortable night clothing. Baby should learn to sleep through ordinary household noises but he needs reasonable quiet.

It is best for baby to sleep in a bed by himself. Besides being more comfortable it is safer, because a baby sleeping with his mother may be overlain and suffocated. In addition, he lies close to his mother and probably breathes in her used-up breath instead of the pure fresh air which he needs. He sleeps less soundly because he is disturbed by his mother's movements and when awakened may develop the bad habit of expecting to be fed one or more times during the night.

Therefore, see that baby has his own cot with firm mattress, soft chaff shakedown, and a very small pillow or no pillow at all. Large soft pillows are unhealthy and dangerous.

Sleeping Routine.

In developing good sleeping habits, regularity is important. In the early months of life baby should sleep most of the time, waking only for food. As he gets older he stays awake a longer and longer part of each day. Usually the first

wakeful period noticed is in the afternoon before the 6 p.m. feeding. As soon as this wakeful period develops baby needs a real bedtime, which needs careful management from the beginning.

After a quiet playtime free from excitement baby is prepared for bed. He is washed, his napkin is changed, and his night clothes put on.

He is then fed, cuddled a little by mother, his napkin changed again if necessary. Then he is quietly laid in bed and softly covered, the lights put out, the door closed and baby is left to go to sleep. If this is done at the same hour each night baby will soon become accustomed to going to sleep when he is put to bed.

If parents have any problem in regard to their children's sleeping and other matters connected with children, advice may be obtained by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

IN THE FARM KITCHEN.

RECIPES WORTH TRYING.

Date Drops.

Half a pound sifted flour, ½ teaspoon salt, ½ teacup chopped dates or ¼ teacup each of dates and nuts, ¼ lb. butter, 1 teacup sugar, ½ teaspoon vanilla essence, 1 beaten egg (fresh or dried), ¼ teacup milk. Sift flour and salt. Stir in dates or dates and nuts. Beat butter till softened. Gradually beat in sugar, then vanilla and egg. Stir in flour, alternately with milk, beating until smooth, after each addition. Drop from a teaspoon on to a greased baking sheet a little apart, and bake in a moderate hot oven for 8 to 12 minutes. There should be about 2½ dozen drops.

Lemon Sponge Pudding.

Six ounces self-raising flour, 2 oz. fat, rind of 1 or 2 lemons (according to size), ¼ lb golden syrup, barely 5 desertspoons milk. Rub the fat into the flour, and add the finely-grated rind of the lemons. Mix well together, then make a hole in the centre. Drop the golden syrup into the centre of the flour and stir in the milk gradually, mixing in the flour by degrees. When it is all well mixed together, turn into a greased mould or basin, cover it with a greased paper, and steam for one hour. When cooked, turn on to a hot dish and serve with lemon sauce.

Fish Balls.

Two cups smoked fish, 4 cups potatoes, 2 eggs, 1 tablespoon butter, pepper. Cut the fish into pieces and mix with cooked, mashed potatoes. Add beaten eggs, butter and pepper. Beat well. Drop by spoonfuls into deep fat, frying until brown, and drain on paper.

Parsley Syrup.

Ingredients: 5 oz. parsley, including stalk, 1½ pints boiling water, 1 lb. sugar, 1 teaspoon vinegar.

Wash the parsley and roots thoroughly and dry in a cloth. Put in a saucepan with the water and boil till the water has reduced to a pint. Strain and return to pan with the sugar. Boil for 20 minutes, stir in vinegar and pour into hot jars. Seal while still hot. Makes about 3 lb. jars of syrup.

Cheese Splits.

For one dozen splits: Half a pound flour, ½ level teaspoon salt, 2 heaped teaspoons baking powder; ½ oz. fat, 2 oz. to 3 oz. grated cheese, about ¼ pint milk and water. Filling: Two teaspoons mayonnaise, 1 teaspoon vinegar, seasoning, 1 teaspoon chopped parsley, or chopped watercress, or both, 2 eggs. Sift together flour, salt and baking powder. Rub in fat, mix in cheese, stir in enough liquid to make a soft dough as for scones. Roll out to ½ inch thick, stamp out rounds with a 2½-inch plain cutter, brush with milk and water and bake in a hot oven for 15 to 20 minutes. When cold, split, spread with filling made by chopping eggs, seasoning, adding parsley and binding with mixed mayonnaise and vinegar.

Garnish with parsley and watercress.

QUEENSLAND WEATHER IN SEPTEMBER.

During the month opportune and over average aggregate rains of approximately one to three inches were recorded from the Warrego district east through the Maranoa and Downs to the South Coast, Port Curtis and Moreton Divisions. The Moreton, Downs and Maranoa areas received most of the two to three inch totals during unsettled periods between the 14h and 17th and 24th and 27th. Apart from some local thunder and hail damage in the middle of the month these rains followed a dry spell lasting through most of July and August and were of general benefit to the wheat areas of record acreage and also gave a needed seasonal impetus to dairying and other farming pursuits in the South-East districts. Some scattered variable rains penetrated the adjacent sections of the Central Lowlands and Highlands and the Rockhampton to Mackay area of the Central Coast, but in western border, central interior and tropical sections of the State it was practically rainless. Even in the Central Coast and Far North Coast areas many stations reported no rain. Practically all the above pastoral areas need early spring storms for temporary relief and further follow-up rains to recuperate from the protracted dry conditions and lack of normal summer monsoonal rains.

Pressure.—During the month a series of continental high pressure centres moved from west to east across the continent on an inland axis. These were of the fine weather type as far as Queensland was concerned and intervening lows were mostly unfavourably centred to the south of the continent. An isobaric dip formation about the middle of the month in the Gulf country and western Queensland showed a weak upper air north-west circulation on the 15th and this wave formation brought rain and thunderstorms in the south-east quarter of the State. Another somewhat similar trough formation and more active cold front action brought a renewal of the variable rains and local storms in the Southern Divisions 24th to the 26th. Unsettled weather extended to North-east New South Wales and there were some heavy local falls in a restricted area around the Macpherson Range and adjacent Northern Rivers.

Temperatures.—Average maximum temperatures mostly about normal, greatest range Cairns and Mitchell 1.9 deg. and 1.8 deg. below respectively. Warmer towards the end of the month with some over 100 deg. Maximum readings 29th and 30th (Boulia 104 deg.).

Average minimum temperatures generally below normal, 0.2 deg. Mitchell, 0.7 deg. Longreach, others mostly 3 to 5 deg. Frosts were recorded at Tambo 2-4th; Mitchell 3-7th, 10-11th; Kingaroy 3-8th, 10-12th (21 deg. on 4-5th); Stanthorpe 3-8th, 10-12th, 18-19th, 29-30th (19 deg. on grass 4th).

The rain position is summarised below:—

Divisions.	Normal Mean.	Mean September 1948.	Departure from Normal.
	Points.	Points.	Per. Cent.
Peninsula North	13	3	77 below
Peninsula South	24	0	100 ,,
Lower Carpentaria	17	1	94 ,,
Upper Carpentaria	36	2	94 ,,
North Coast, Barron	92	0	100 ,,
North Coast, Herbert	155	10	94 ,,
Central Coast, East	108	13	88 ,,
Central Coast, West	70	11	84 ,,
Central Highlands	102	63	38 ,,
Central Lowlands	65	13	80 ,,
Upper Western	29	1	97 ,,
Lower Western	44	4	91 ,,
South Coast, Port Curtis	141	174	24 above
South Coast, Moreton	206	289	40 ,,
Darling Downs, East	167	206	23 ,,
Darling Downs, West	104	213	105 ,,
Maranoa	118	313	165 ,,
Warrego	88	112	27 ,,
Far South-West	56	19	66 below

Commonwealth of Australia, Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

DECEMBER, 1948.

Supplied by W. J. Newell, Hon. Secretary of the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.45	6.28	Cairns	51	7	Longreach	44	26
6	4.46	6.32	Charleville ..	30	24	Quilpie	33	37
11	4.47	6.35	Cloncurry	65	35	Rockhampton ..	19	1
16	4.49	6.38	Cunnamulla ..	27	32	Roma	19	15
21	4.51	6.41	Dirranbandi ..	16	22	Townsville ..	42	8
26	4.54	6.43	Emerald	28	11	Winton	52	29
31	4.56	6.46	Hughenden ..	49	21	Warwick	2	6

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Day.	Rise.	Set.
	a.m.	p.m.
1	4.40	7.06
2	5.31	8.08
3	6.25	9.04
4	7.23	9.53
5	8.22	10.35
6	9.20	11.12
7	10.16	11.44
8	11.09	..
	p.m.	a.m.
9	12.02	12.13
10	12.53	12.41
11	1.46	1.08
12	2.40	1.37
13	3.37	2.07
14	4.38	2.41
15	5.41	3.21
16	6.45	4.08
17	7.47	5.03
18	8.45	6.05
19	9.35	7.12
20	10.20	8.20
21	11.59	9.28
22	11.34	10.33
23	..	11.36
	a.m.	p.m.
24	12.07	12.39
25	12.40	1.41
26	1.14	2.44
27	1.52	3.49
28	2.34	4.52
29	3.21	5.55
30	4.14	6.53
31	5.10	7.45

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	29	10	45	24	20	0	52	27
6	27	13	43	28	18	2	51	31
11	17	19	33	36	8	10	37	41
16	9	30	25	44	0	20	26	53
21	14	25	30	41	5	16	34	48
26	24	13	40	29	15	3	46	32
31	30	9	46	24	21	0	53	26

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	53	4	67	33	50	19	44	5
3	56	2	68	32	52	17	46	3
5	52	7	66	35	50	21	43	8
7	44	16	61	41	45	26	37	15
9	34	26	54	47	38	33	29	22
11	25	31	47	51	32	36	21	26
13	15	41	40	58	25	44	14	35
15	6	50	35	63	20	49	6	42
17	2	56	33	67	17	53	3	46
19	8	52	36	65	21	50	8	44
21	19	43	42	58	27	45	17	36
23	28	31	50	52	34	37	24	27
25	35	19	54	43	39	28	29	17
27	46	9	62	36	47	22	38	9
29	54	3	67	32	51	18	44	4
31	55	3	68	32	51	18	45	4

Phases of the Moon.—New Moon, 1st December, 4.44 a.m.; First Quarter, 8th December, 11.57 p.m.; Full Moon, 16th December, 7.11 p.m.; Last Quarter, 23rd December, 3.12 p.m.; New Moon, 30th September, 7.44 p.m.

On 22nd December the Sun will reach its maximum angle south of the equator and will then rise and set, as viewed from Queensland, from 25 degrees to 27 degrees south of true east and true west respectively.

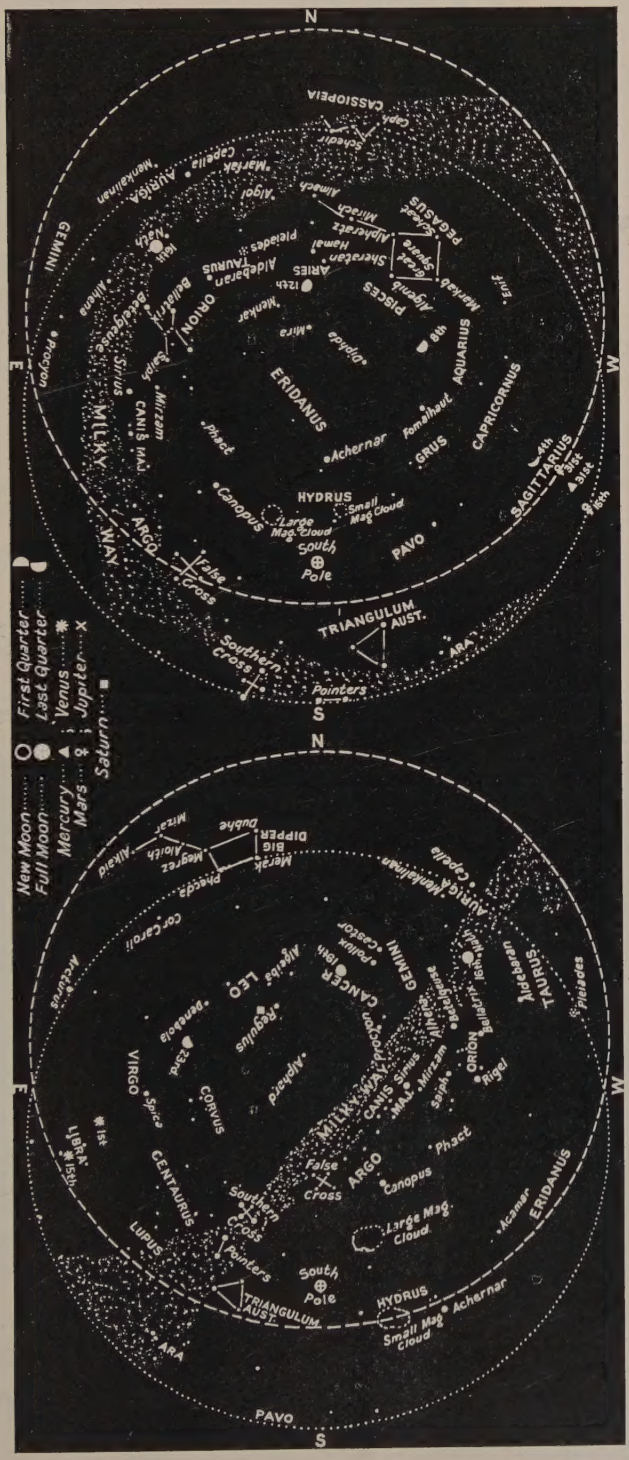
Mercury.—At the beginning of the month, in the constellation of Scorpio will rise 20 minutes before the sun but on the 12th it will be in line with the Sun, after which it will become an evening object and at the end of the month, in the constellation of Sagittarius will set 48 minutes after sunset.

Venus.—Still a brilliant object in the morning sky. At the beginning of December, in the constellation of Libra will rise between 3 a.m. and 4.15 a.m. and after passing through the constellation of Scorpio, at the end of December, in the constellation of Ophiuchus, will rise about 10 minutes later than on the 1st.

Mars.—In the constellation of Sagittarius will be visible low in the west during evening twilight. On the 1st it will pass 1 degree to the south of Jupiter when it will set about 2 hours after the Sun. By the end of the month it will set only 1 hour after the Sun.

Jupiter.—In the constellation of Sagittarius also, and visible low in the west during evening twilight in the early part of the month but by the end of December will be too close in line with the Sun for observation.

Saturn.—In the constellation of Leo, on the 1st will rise at midnight and at the end of the month will rise between 10 p.m. and 11.15 p.m.



Star Charts.—The chart on the right is for 8.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border on the 15th December. (For every degree of longitude we go west, the time increases by 4 minutes). The chart on the left is for 9 hours later. On each chart the dashed circle is the horizon as viewed from Cape York and the dotted circle is the horizon for places along the New South Wales Border. When facing North hold "N" at the bottom; when facing South hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars, which do not change their relation to one another moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

SEPTEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of years' records.	Sept. 1947.	Sept. 1948.		Sept.	No. of years' records.	Sept. 1947.	Sept. 1948.
North Coast.	In.		In.	In.	*South Coast—cont.*	In.		In.	In.
Atherton	0·74	42	2·48	0·00	Gatton College ..	1·43	44	2·65	..
Cairns	1·65	61	2·92	0·00	Gayndah	1·47	72	4·26	1·68
Cardwell	1·47	71	5·92	0·17	Gympie	2·02	73	3·45	1·83
Cooktown	0·56	67	0·61	0·00	Kilkivan	1·61	62	3·39	1·07
Herberton	0·55	57	1·48	0·00	Maryborough ..	1·84	72	4·57	1·40
Ingham	1·51	51	3·09	0·12	Nambour	2·26	47	5·07	2·60
Innisfail	3·52	62	7·43	0·02	Nanango	1·71	61	2·48	1·86
Mossman	1·93	19	5·21	0·19	Rockhampton ..	1·22	72	2·92	0·39
Townsville	0·70	72	2·62	0·00	Woodford	2·04	55	3·07	1·40
Central Coast.					*Central Highlands.*				
Ayr	1·21	56	2·49	0·00	Clermont	0·95	72	3·26	0·19
Bowen	0·77	72	1·18	0·00	Springsure	1·22	74	3·54	0·56
Charters Towers ..	0·75	61	2·32	0·04					
Mackay	1·60	72	1·26	0·13	*Darling Downs.*				
Proserpine	1·89	40	4·26	0·00	Dalby	1·61	73	2·27	1·75
St. Lawrence ..	1·19	72	1·81	0·12	Emu Vale	1·66	47	2·82	1·56
South Coast.					Jimbour	1·52	64	2·15	1·65
Biggenden	1·38	44	3·64	0·95	Miles	1·26	58	3·18	2·48
Bundaberg	1·48	60	5·56	0·94	Stanthorpe	2·19	70	3·05	2·42
Brisbane Bureau ..	1·93	96	2·93	2·98	Toowoomba	2·01	71	4·05	2·81
Caboolture	1·76	67	3·49	1·84	Warwick	1·75	78	2·73	1·20
Childers	1·64	48	4·85	1·39	*Maranoa.*				
Crohamhurst	2·49	50	3·87	..	Roma	1·32	69	2·69	3·12
Esk	1·94	56	2·67	1·78	St. George	1·03	62	2·50	1·73

CLIMATOLOGICAL DATA FOR SEPTEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	81	61	87	30	52	3, 26	0	..
Herberton	..	79	49	86	9	35	3	0	..
Townsville	..	82	60	93	17	48	4	0	..
Rockhampton	30·07	82	53	97	29	38	4	39	2
Brisbane	..	..	..	..	..	..	..	..	..
Darling Downs.									
Dalby	..	74	44	90	30	32	4, 11	175	4
Stanthorpe	..	66	40	85	30	28	4	242	8
Toowoomba	..	68	45	82	7	35	6	281	7
Mid-Interior.									
Georgetown	..	90	56	100	30	42	2, 3	0	..
Longreach	30·09	85	53	100	29, 30	40	7	4	1
Mitchell	30·08	76	45	94	30	29	4	340	6
Western.					10, 15				
Burketown	..	89	60	95	16, 27	49	3	0	..
Boulia	30·04	85	52	104	30	44	2, 3, 4	0	..
Thargomindah	30·03	80	50	103	30	40	3	5	1

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